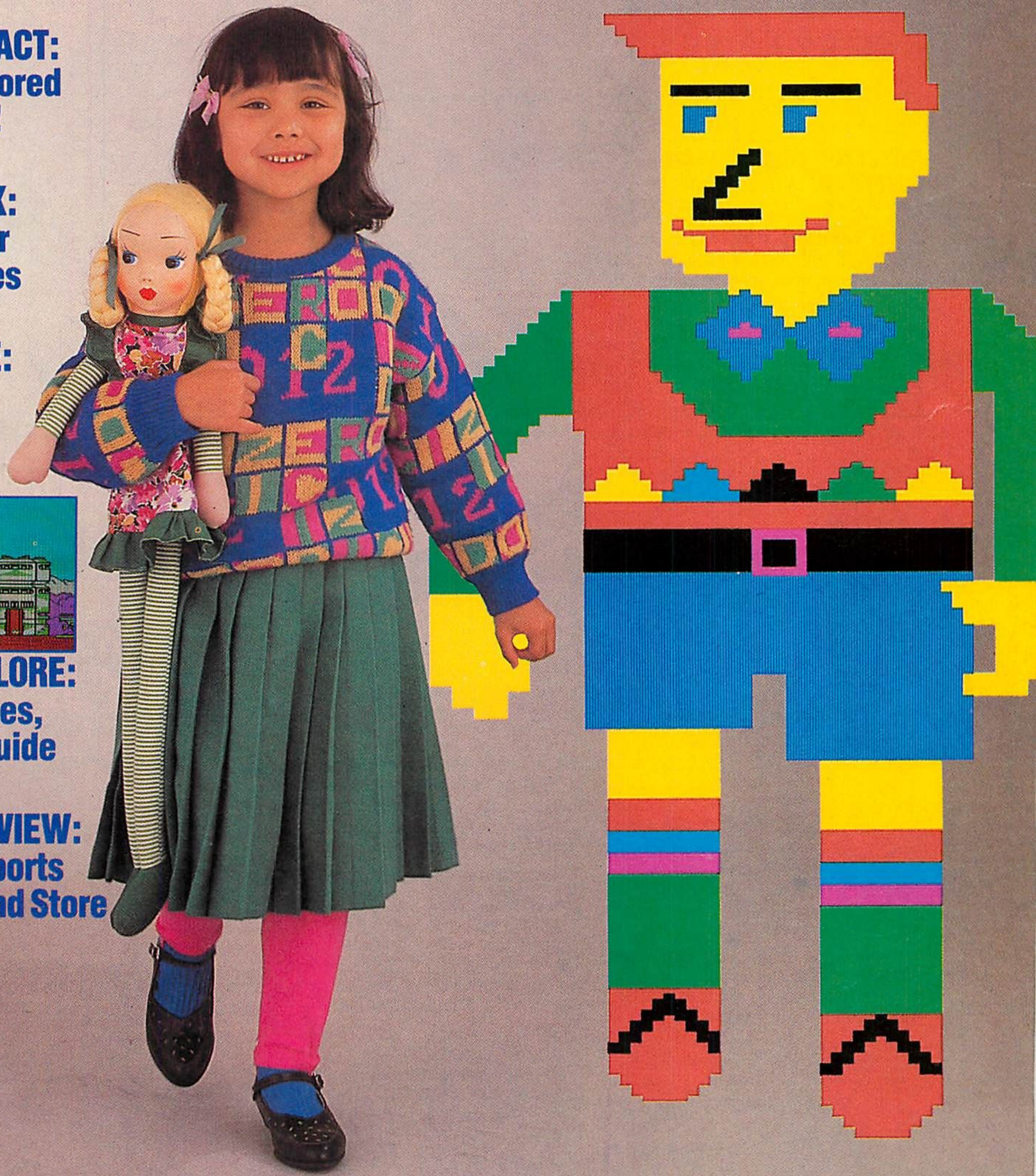
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**DISC INDEX:** Solution for the lost files

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**GAMES GALORE:** New releases, Stryker's guide

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ISSUE No 54 JANUARY 1987

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# COVER




Computer graphics by Jonathan Inglis
model Sarah Smith
clothes by 012/Benettor
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# NEXT MONTH

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Instruct your micro using sound
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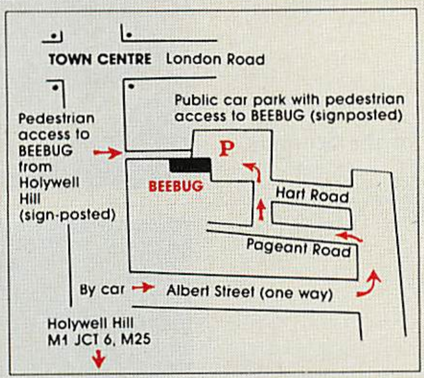
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| 0197G | Compact+Mono Monitor | 549.00 | 521.55 |
| 0198G | Compact TV System | 469.00 | 445.55 |
| 0199G | Compact Entry System | 449.00 | 426.55 |
| 0200G | Master 128 | 489.00 | 464.55 |
| 0202G | Master ET | 381.32 | 362.25 |
| 0223G | Master Disc Drive Unit | 316.00 | 300.20 |
| 0230C | 65C102 6502 "Turbo" | 119.00 | 113.05 |
| 0231D | 80186 Co-Proc | 395.00 | 375.25 |
| 0234B | M128 Econet Module | 48.87 | 46.43 |
| 0235B | M128 Eprom Cartridge | 15.18 | 14.42 |
| 0240C | M128 Manual 1 ADJ22 | 14.95 | 14.20 |
| 0241C | M128 Manual 2 ADJ23 | 14.95 | 14.20 |
| 0242C | M128 Adv Ref Manual | 19.00 | 18.05 |
| 0203F | '6502' 2nd Processor | 207.00 | 196.65 |
| 0204F | 'Z80' 2nd Processor | 335.80 | 319.01 |
| 0205F | Acorn Prestel Adapt | 138.00 | 131.10 |
| 0206F | Acorn Teletext Adapt | 115.00 | 109.25 |
| 0217B | 1770 Disc Interface | 50.24 | 47.73 |
| 0218A | ADFS Upgrade 1770 | 29.33 | 27.86 |
| 0209A | 1.2 DNFS Rom | 19.78 | 18.79 |
| 0207A | Basic II Rom | 21.85 | 20.76 |
| 0250A | Compact 5.25" Disc Drive Lead | 12.32 | 11.70 |
| 0298A | Compact Printer Lead | 9.78 | 9.29 |

## DISC DRIVES

| Code | Description | Price | Mem Price |
|---|---|---|---|
| 0600F | Cumana CSX100 40T | 106.95 | 101.60 |
| 0610F | Cumana CS100 40T | 126.50 | 120.18 |
| 0601G | Cumana CDX200 40T | 215.00 | 204.25 |
| 0602F | Cumana CSX400 40/80T | 142.60 | 135.47 |
| 0603F | Cumana CS400 40/80T | 162.15 | 154.04 |
| 0604G | Cumana CD800S 40/80T | 286.35 | 272.03 |
| 0614F | Cumana CS100E | 118.45 | 112.53 |
| 0615F | Cumana CS400E | 155.00 | 147.25 |
| 0222F | Disc Starter Pack | 163.00 | 154.85 |
| 0611A | Cumana Disk Guide | 1.90 | 1.80 |
| 0650B | Memorex DiscsSSDD 40 | 15.50 | 14.73 |
| 0651B | Memorex DiscsDSDD 80 | 25.50 | 24.22 |
| 0669B | Memorex 10 x 35" Discs | 25.00 | 23.75 |
| 0653A | Disc Case 10 discs | 2.25 | 2.14 |
| 0654C | Disc Box - up to 50 | 11.99 | 11.39 |

## MONITORS

| Code | Description | Price | Mem Price |
|---|---|---|---|
| 0501H | Kaga KX1202 Monitor | 116.00 | 110.20 |
| 0502H | Kaga KX1203 Monitor | 116.00 | 110.20 |
| 0556A | Taxan 1201/2/3 BNC | 3.90 | 3.70 |
| 0571D | Stand for KX Series | 29.00 | 27.55 |
| 0503G | Zenith 123 12" Green | 83.00 | 78.85 |
| 0504G | Zenith 122 12" Amber | 88.37 | 83.95 |
| 0530H | Microvitec 1431 Mon. | 212.75 | 202.11 |
| 0531H | Microvitec 1451 Mon. | 269.10 | 255.65 |
| 0550A | 1.0m Mon. Lead RGB | 5.75 | 5.46 |
| 0535H | Supervision III RGB | 379.50 | 360.52 |
| 0536H | Supervision II RGB | 318.55 | 302.62 |
| 0555A | Supervision Mon. Lead | 7.00 | 6.65 |
| 0570D | Stand for Supervision | 29.00 | 27.55 |
| 0551E | Single Master Plinth | 16.10 | 15.30 |
| 0552E | Single Plinth | 12.65 | 12.02 |
| 0553F | Double Plinth | 23.00 | 21.85 |
| 0572C | Kaga Monitor Stand KTIII | 19.00 | 18.05 |

## PRINTERS

| Code | Description | Price | Mem Price |
|---|---|---|---|
| 0299G | Panasonic KX-P1080 | 170.20 | 161.69 |
| 0311G | Kaga KP 815 | 299.00 | 284.05 |
| 0316G | Taxan KP915 17" | 410.37 | 389.85 |
| 0319G | Epson FX85 NLQ | 368.00 | 349.60 |
| 0320D | FX85 Tractor Feed | 32.20 | 30.59 |
| 0321D | FX85 Sheet Feeder | 130.00 | 123.50 |
| 0300G | Brother HR15XL Para | 350.75 | 333.21 |
| 0301G | Brother HR15XL Ser. | 350.75 | 333.21 |
| 0310G | Juki 6100 Daisywheel | 362.25 | 344.14 |
| 0309F | Ibico LTR1 NLQ | 105.16 | 99.90 |
| 0303G | Canon PJ1080A col. | 520.00 | 494.00 |
| 0308G | Epson JX 80 colour | 520.00 | 494.00 |
| 0318G | Epson HI 80 Plotter | 368.00 | 349.60 |
| 0400A | Platten Cleaner Kit | 6.44 | 6.12 |
| 0401A | 2M Printer Lead | 8.00 | 7.60 |
| 0402A | Epson FX/RX80 Ribbon | 4.00 | 3.80 |

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|---|---|---|---|
| 0403A | Epson FX/RX100 Ribbon | 5.00 | 4.75 |
| 0408A | Canon/Taxan Ribbon | 5.63 | 5.35 |
| 0409A | Black Cart PJ1080A | 7.19 | 6.83 |
| 0410A | Colour Cart PJ1080A | 9.99 | 9.49 |
| 0413A | LX 80 Ribbon | 4.60 | 4.37 |
| 0414A | Ibico Ink Roller | 4.60 | 4.37 |
| 0415A | Epson JX80 Ribbon | 16.22 | 15.40 |
| 0417A | Shinwa CP80 Ribbon | 3.54 | 3.36 |
| 0418A | Juki 6100 S/S Ribbon | 1.55 | 1.47 |
| 0423A | Panasonic KX-P1080 Ribbon | 5.75 | 5.46 |
| 0406D | 11" *9.5" Paper 2000 | 14.03 | 13.33 |
| 0453G | 2-part NCR Paper | 23.00 | 21.85 |
| 0407C | 3.5" *1 7/16" Labels | 5.63 | 5.35 |
| 0416A | Dust Cover KP810 | 5.45 | 5.18 |

## WATFORD HARDWARE

| Code | Description | Price | Mem Price |
|---|---|---|---|
| 0213A | Watford DFS Rom+Man | 27.48 | 26.11 |
| 0214B | Watford DDFS Kit | 56.35 | 53.53 |
| 0216A | Watford DFS Manual | 6.95 | 6.60 |
| 0219B | Watford 1.43 DFS Kit | 62.10 | 59.00 |
| 0702A | Watford 32K RAM Card | 67.28 | 63.91 |
| 0709D | Watford Eprom Eraser | 33.35 | 31.68 |
| 0717A | Watford Sideways ZIF | 17.83 | 16.93 |
| 0736A | Watford 12 Rom Board | 36.80 | 34.96 |
| 0750B | Watford S/State 16K | 32.20 | 30.59 |
| 0751B | Watford 16K Module | 30.59 | 21.85 |
| 0753B | Rom/Ram Board 64K | 67.85 | 64.46 |
| 0754B | Rom/Ram Board 128K | 102.35 | 97.23 |
| 0755A | Write Protect Mk12 | 2.76 | 2.62 |
| 1120B | Watford TD Rom (SD) | 28.75 | 27.31 |

## OTHER HARDWARE

| Code | Description | Price | Mem Price |
|---|---|---|---|
| 0701A | Aries B32 RAM Card | 93.15 | 88.49 |
| 0704A | ATPL ROM Board BBC | 39.67 | 37.69 |
| 0735A | ATPL Battery Backup | 17.37 | 16.50 |

| | | | |
|---|---|---|---|
| 0740B | Aries B12 Rom Board | 46.00 | 43.70 |
| 0705A | 2764 8K Eprom | 2.64 | 2.51 |
| 0706A | 27128 16K Eprom | 3.33 | 3.17 |
| 0707A | 6264 8K Ram | 3.68 | 3.50 |
| 0708A | Eprom Extractor Tool | 3.45 | 3.28 |
| 0710B | Spotlife Rom Blower | 75.90 | 72.11 |
| 0715A | Dust Cover BBC B/B+ | 3.45 | 3.28 |
| 0734A | Dust Cover Master | 4.60 | 4.37 |
| 0716F | Music 500 | 86.32 | 82.00 |
| 0718B | Voltmace 3B Single | 9.99 | 9.49 |
| 0719B | Voltmace 3B Twin | 17.00 | 16.15 |
| 0720B | Voltmace Delta 14B | 12.50 | 11.88 |
| 0721B | Voltmace Delta 14B/1 | 13.00 | 12.35 |
| 0762E | Beebug Magic Modem | 95.00 | 90.25 |
| 0763E | Beebug Modem+ S'ware | 109.00 | 103.55 |
| 0810D | BBC Keyboard | 52.90 | 50.26 |
| 0811A | Video ULA Chip | 17.25 | 16.39 |
| 0812A | A to D D7002C Chip | 5.29 | 5.03 |
| 0814A | Keyboard Connector | 5.75 | 5.46 |
| 0815A | 65C02 CPU | 13.80 | 13.11 |
| 0764F | Red Box Starter System | 129.00 | 122.55 |
| 0765D | Red Leader | 59.95 | 56.95 |
| 0766D | Red One | 34.95 | 33.20 |
| 0767D | Red Two | 34.95 | 33.20 |
| 0809D | Master Keyboard | 52.90 | 50.26 |
| 0823D | Master PSU | 69.50 | 66.03 |

## COMPUTER CONCEPTS

| Code | Description | Price | Mem Price |
|---|---|---|---|
| 1100C | Wordwise Plus | 46.00 | 43.70 |
| 1101B | WW + Progbook & Disc | 20.53 | 19.50 |
| 1102A | Wordwise | 28.75 | 27.31 |
| 1103B | C.C. Graphics ROM | 24.73 | 23.49 |
| 1104B | Printmaster (Epson) | 28.00 | 26.60 |
| 1105B | Printmaster (Star) | 28.00 | 26.60 |
| 1106B | Accelerator | 56.01 | 53.20 |
| 1107B | Speech ROM | 28.00 | 26.60 |
| 1109B | Disc Doctor | 27.00 | 25.65 |

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|---|---|---|---|
| 1110B | Intersheet | 44.85 | 42.61 |
| 1111A | Hi Intersheet Disc | 5.75 | 5.46 |
| 1112A | Hi Wordwise+ Disc | 5.75 | 5.46 |
| 1113B | Caretaker Rom | 28.75 | 27.31 |
| 1114B | Interchart | 29.90 | 28.41 |
| 1115B | Speech System TTS | 30.99 | 29.44 |
| 1117B | Interword | 50.03 | 47.52 |

## ACORNSOFT

| Code | Description | Price | Mem Price |
|---|---|---|---|
| 1000B | Acornsoft View | 44.28 | 42.06 |
| 1022C | View 3.0 Rom | 66.70 | 63.36 |
| 1002B | Acornsoft Hi-View | 44.28 | 42.06 |
| 1013B | View Print/Drive T. | 8.62 | 8.19 |
| 1014B | View Print/Drive Disc | 9.77 | 9.29 |
| 1043B | Acorn Viewspell Rom | 34.02 | 32.32 |
| 1021A | Acorn Viewindex Disc | 14.37 | 13.66 |
| 1019B | Acorns Viewstore Rom | 44.28 | 42.06 |
| 1030B | Acornsoft ViewPlot | 25.30 | 24.03 |
| 1001B | Acornsoft View Sheet | 44.28 | 42.06 |
| 0243A | Master Lisp C.ROM | 59.69 | 56.70 |
| 1003A | Acornsoft Lisp Rom | 41.40 | 39.33 |
| 1025B | Acornsoft Lisp Cass | 10.35 | 9.83 |
| 1041B | Acornsoft Forth Rom | 38.53 | 36.60 |
| 1042B | Acornsoft Forth Disc | 19.00 | 18.05 |
| 1027C | Micro PROLOG | 74.75 | 71.01 |
| 1033B | Microtext Disc | 55.20 | 52.44 |
| 1034C | Microtext Plus Rom | 240.00 | 228.00 |
| 1035B | 6502 Dev. Pack | 45.00 | 42.75 |
| 1004B | Acornsoft BCPL | 50.03 | 47.52 |
| 1026B | BCPL Generator | 43.57 | 41.39 |
| 1005B | Acornsoft Comal | 41.97 | 39.88 |
| 1006B | Acornsoft Logo | 50.71 | 48.18 |
| 0244A | Master PASCAL C.ROM | 67.85 | 64.46 |
| 1007C | Acornsoft ISO Pascal | 50.71 | 48.18 |
| 1028B | Pascal Generator | 32.78 | 31.14 |
| 1031B | Acorn Termulator Rom | 31.05 | 29.50 |
| 1008B | Acornsoft Basic Ed | 28.00 | 26.60 |

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|---|---|
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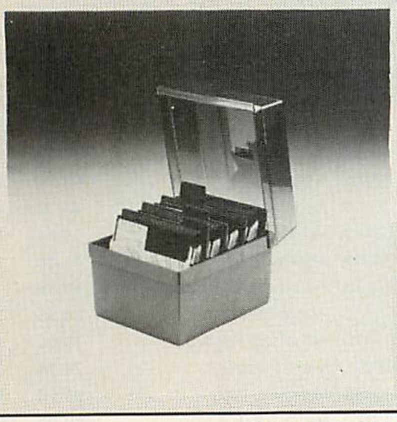
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| 25 | S/S | £26.47 | £25.15 | 25 | D/S | £29.00 | £27.55 |
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|---|---|---|---|
| 1040C | Micros Business Disc | 47.27 | 44.90 |
| 1037B | Database Cassette | 11.50 | 10.93 |
| 1038B | Database Disc | 14.50 | 13.78 |
| 1017B | Acornsoft GXR B | 25.43 | 24.16 |
| 1018B | Acornsoft GXR B+ | 25.43 | 24.16 |
| 1039B | Creative Sound Disc | 19.00 | 18.05 |
| 1015B | Acornsoft Revs Disc | 17.08 | 16.22 |
| 1029A | Revs 4 Tracks Disc | 11.95 | 11.35 |
| 1024B | Acornsoft Revs Cass | 14.00 | 13.30 |
| 1032B | Revs 4 Tracks Tape | 9.32 | 8.85 |
| 1016B | Acorn Aviator Disc | 17.08 | 16.22 |
| 1044B | Acorn Aviator Cass | 14.00 | 13.30 |
| 1036B | Elite Disc All'vers | 19.95 | 18.95 |

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|---|---|---|---|
| 0703B | AMX Mouse | 74.75 | 71.01 |

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|---|---|---|---|
| 1150B | AMX Desk Disc | 19.00 | 18.05 |
| 1151B | AMX 3D Zicon Disc | 19.00 | 18.05 |
| 1152B | AMX Database Disc | 19.00 | 18.05 |
| 1153B | AMX XAM | 19.00 | 18.05 |
| 1154C | AMX Pagemaker Plus | 40.00 | 38.00 |
| 1155B | AMX Superart Rom | 40.00 | 38.00 |
| 1156B | AMX Paint Pot Disc | 10.99 | 10.44 |
| 1157C | AMX Mind Games Disc | 14.50 | 13.78 |
| 1158A | AMX Zap Zone Cass | 4.90 | 4.65 |
| 1160B | AMX Utilities | 10.99 | 10.44 |

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| 1124A | Citadel 40/80 | 11.95 | 11.35 |
| 1125A | White Knight Disc | 18.63 | 17.70 |
| 1126B | White Knight Cass | 9.89 | 9.40 |
| 1127A | White Knight 1770 | 18.63 | 17.70 |
| 1128B | Movie Maker | 20.95 | 19.91 |
| 1129A | THRUST | 11.95 | 11.35 |
| 1130A | REPTON2 | 11.95 | 11.35 |
| 1170D | Fleet Street 40T | 37.95 | 36.05 |
| 1171D | Fleet Street 80T | 37.95 | 36.05 |
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| 1173A | Mini Office II 40T | 16.50 | 15.68 |
| 1174A | Mini Office II 80T | 16.50 | 15.68 |
| 1175A | Clares Replica III | 15.00 | 14.25 |
| 1011B | BBCsoft UltraCalc 2 | 70.00 | 66.50 |
| 1012A | Advanced Teletext Rom | 7.96 | 7.59 |
| 1418A | £1 Gift Voucher | 1.00 | 1.00 |
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# NEWS

## Next month in AU

Control your BBC by whistling – thanks to Joe's Jottings. Joe Telford shows how to take a cheap keyring locator and link it to your micro. Just whistle and it'll obey your every command. A simple project to introduce beginners to computer interfacing.

Compact owners can check out the market for joysticks with David Atherton, and type in a program to convert games from keyboard to joystick.

And for readers with a graphics or maths interest, there's the Tree of Pythagoras. The history is fascinating, and if you don't want the maths, just type in the listings, sit back and watch.

Also on the graphics front is an embroidery pattern designer from Holland. You'll be surprised how much can be learnt about the way the BBC micro's screen works.

For more practical application for graphics, Peter Sandford follows on from this month's feature on displaying *ViewStore* and *ViewSheet* data.

Gamesters can latch onto Dave Lawrence's game page with the latest on the BBC games scene with tips for the high-scores.

Utility software for education comes under review and Robin Newman puts network users on the right track.

Artistically-inclined readers can tune into an *Artroom* review. And, to end on a seasonal note, here's a sample of what's possible with the system:

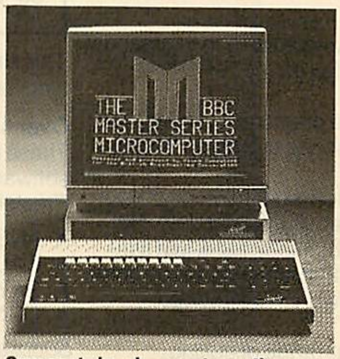



# BBC sales spark software exports

British software companies are being to urged to exploit a multi-million pound export market created by the export of Acorn computers to governments to equip schools.

BBC micros are already on display in British Council offices all over the world and next year there is to be a travelling exhibition. They are promoting books, hardware and software as well as establishing the necessary contacts in education ministries. The Publishers Association and Department of Trade & Industry are also helping.

Acorn is negotiating in Algeria and Egypt. Poland is reported already to have 1700 Compacts and 300 Masters. The deal whereby Olivetti has badged the machine in Italy as the Prodest 128S is reported to




Compact: developments continue

be going better than expected, and The Master 512 has made some headway.

Further, the country's education ministry is looking into translating education programs.

Poland has set aside 2 billion zloties to put computers into schools, and has waved import duties. A new computer magazine sold out after printing 150,000 copies. One agent told *Acorn User*: 'It's no good trying to dump over there. They want the best and they're prepared to pay'.

The Publishers Association has sounded warnings though, as some countries do not have any copyright agreements. Also others have currency exchange problems. Despite this difficulty, 1700 compacts were sold to a polish mining co-operative as a bonus for miners.

Clares has repeated its deal with Olivetti to sell the *Artroom* package in Italy. Now *Beta-Base* has been taken on. Negotiations for other emigrees are under way.

To help the Compact here:

- Comet is to take the machine in its 200 stores.
- Peartree is to launch a 1MHz bus interface for the Compact in the New Year.

## Domesday master work

The BBC launched its Domesday package last month, featuring a Master controlling a Philips video disc player.

The system is the culmination of a two year project to prepare a modern-day equivalent of William the Conqueror's Domesday Book, and was launched with a TV series to match on the 900th anniversary of the original.

Alistair Milne, director general of the BBC, said the system 'could revolutionise access to information'. The two Domesday video discs hold 250,000 pages of text, 50,000 photographs, 24,000 maps and 60 minutes of short film clips. Much of the information was gathered by schoolchildren across the country.

Users can display images such as maps and statistics together, and home in on detailed Ordnance Survey maps from an overall map of Britain.

For about £4000 the system comprises: Master Turbo, Trackerball, monitor, Laservision disc player and the two Domesday discs. More discs are to follow.

## Share forecaster

*Sharemaster* Stock Market forecaster provides point and figure, relative strength, moving averages, momentum and oscillator curves to help assess profitability. For BBC B and Master, it costs £99.95. Synergy, 7 Hillside Rd, Harpenden, Herts A15 4BS.

## M512 U-turn

Acorn has done a U-turn on pricing for the Master 512 upgrade which gives some IBM PC compatibility. The company insisted last month the price was to hold firm, but it's been halved to £199 plus VAT.

## News in brief

- Abico Software has a program to take the hard work out of competitions and tournaments. *Tournament Manager* administers setting up of the competition, displays the scoreboard and even prints out winners' certificates. The disc costs £9.75. Abico, Willow House, Shepreth, Royston, Herts.
- The Big Ben Club is not the only BBC micro club in Holland. The 'De 6502 Kenners' (roughly: 'those who know the 6502') was established in 1977.

  The De 6502 Kenners magazine is published five times a year and there is a software library. Contact De 6502 Kenner, c/o Willem L. van Pelt, Jacob Jordaenstraat 15, 2923 CK Krimoen ad, Ijssel, The Netherlands.
- A machine code program system for both the 6502 and 65C02 processors used in the BBC micro and Master is available from Mijas Software.

  It costs £22 on disc or £29.50 on ROM from Mijas Software, PO Box 2, Sutton Scotney, Winchester, Hants., SO21 3LU.
- Edinburgh Software Products has released a board for the BBC B which holds up to eight of the latest 32k ROMs.

  Many 32k ROMs for the Master – Acornsoft ISO-Pascal for example – run on a model B with the board. It is compatible with *Acorn User's* UserRam. ESP, 1 Castle Street, Edinburgh.
- The Computer Applications Competition offers £8000 in prizes for ideas from school or FE groups under 19 years old. Entries close on February 27, 1987. Application forms from Computing Laboratory, The University of Kent, Canterbury, Kent CT2 7NF.
- **Checksums:** Check your typing with our checksums for all the major listings in this issue. Send a large sae with a 24p stamp to: Acorn User January Checksums, PO Box 641, London NW9 8TF.

# Electronic mail runs at cheap call rate

A unique new electronic mail system is currently being tested by SJ Research for general release in January. SJ Interspan is a computerised message passing system which takes care of all the telephone calls itself.

Interspan operates as an overnight service which, although slower than other electronic mail services such as Telecom Gold or One-to-One, is considered fast enough for most users.

### Cheap-rate calls

The system requires a BBC micro fitted with an auto-answer modem. The Interspan central computer phones up each participant at night when the lines are unused and the rates cheapest. A case of don't call us, we'll call you!

Any messages for a user are downloaded from the central computer and outgoing messages transmitted by the local software. Any files, including wordprocessed text and programs, can be handled by the Interspan service and SJ Research hopes this will appeal to school and college groups looking to swap software.

SJ is initially providing the service for schools and colleges only, as most already have all equipment needed.

SJ said the Interspan service will be priced 'aggressively' compared to other electronic mail services. Projected prices are an enrollment fee of £25, a fixed fee of £12.50 per quarter and mail costs of 1 pence a message plus 2 pence per kilobyte transmitted.

### Software distribution

Plans are afoot to sell software using Interspan. SJ claimed distribution costs of an 8k ROM at 17 pence a go could revolutionise the nature of software sales, with far more smaller and cheaper programs.

Individual schools could also provide services via Interspan, SJ said. A school with expensive equipment such as a laser printer, could market the use of this with incoming data sent via Interspan. Further details from SJ Research, 108 Mill Road, Cambridge, CB1 2BD.

# Yet more memory capacity from ACP

Advanced Computer Products (ACP) is releasing yet more products for Christmas.

The Advanced EPROM Programmer will handle all sizes and types of EPROM usable on the BBC micro and Master series, from 8k to 1Mbit (128k) chips. Either of the two common programming voltages can be supplied by the unit.

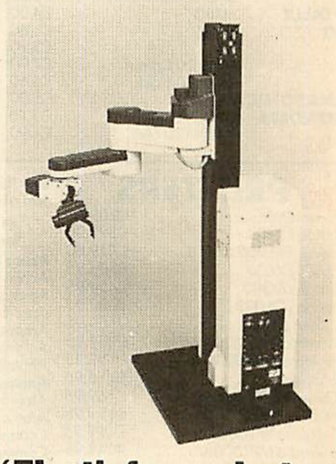
The Advanced ROM adaptor cartridges for the Master and Electron (costing £14.95) can also use the 1Mbit ROMs and software will be available soon to enable such chips to be used in a cartridge on the Master for eight ROM programs occupying a single ROM slot.

ACP claimed the EPROM Programmer's ability to program the 1Mbit ROMs will enable Master users to bundle together several commercial ROMs into one chip.

Another cartridge for the Master and Electron provides 256k sideways RAM which can be used both for sideways ROM programs loaded from disc and as a RAM disc (at twice the speed of 1MHz bus systems) with ACP's Advanced 1770 disc filing system. The RAM can be write protected.

Prices on both the EPROM Programmer and 256k sideways RAM cartridge were expected by ACP to be 'well under £100'. Advanced Computer Products, 6 Ava House, High Street, Chobham, Surrey, GU24 8LZ.

ACP is also developing a Compact add-on to provide a 1MHz bus and user port connectors and a cartridge slot.



## 'First' for robot

'The world's first personal robot' is the billing for the RTX robot arm from Universal Machine Intelligence. It has found many uses including laboratory experiments and disabled assistance.

UMI aims to introduce the RTX with BBC micro into education. Universal Machine Intelligence, The Royal Victoria Patriotic Building, Trinity Road, London SW18 3SX.

# Computers by Post

## LOWEST U.K. PRICES GUARANTEED

### PRINTER RIBBONS

| Make | Model | 2+ | 5+ | 12+ |
|---|---|---|---|---|
| ACORN | AP80 | £2.95 | £2.40 | £2.30 |
| | AP100 | £2.95 | £2.40 | £2.30 |
| AMSTRAD | DMP1 | £3.90 | £3.30 | £3.10 |
| | DMP2000/3000 | £4.60 | £4.30 | £4.20 |
| | PCW8256/8512 | £5.20 | £4.60 | £4.50 |
| BROTHER | HR5 | £3.00 | £2.80 | £2.60 |
| | HR15 Corr | £2.90 | £2.50 | £2.30 |
| | HR15 FAB | £3.60 | £3.10 | £2.90 |
| | HR15 MS | £3.50 | £3.00 | £2.80 |
| | HR15 also for HR25/HR35 | | | |
| | EP44 | £2.90 | £2.50 | £2.30 |
| | M1009 | £3.70 | £3.20 | £3.00 |
| CANON | PW1080A Black | £3.40 | £2.90 | £2.70 |
| | PW1080A Red or Blue | £5.30 | £4.70 | £4.40 |
| | PJ1080 Ink Jet Colour. One Off | | | £10.90 |
| | PJ1080 Ink Jet Black. One Off | | | £8.90 |
| CBM | 1515 | £2.95 | £2.40 | £2.30 |
| | 1525 | £2.95 | £2.40 | £2.30 |
| | MPS801 | £3.90 | £3.30 | £3.10 |
| | 802/1526 | £4.00 | £3.20 | £3.00 |
| | 803 | £3.70 | £3.20 | £3.00 |
| | MPS1000 | £3.00 | £2.60 | £2.40 |
| | 4022 | £3.00 | £2.60 | £2.40 |
| | MSC801 Colour. One Off | | | £18.50 |
| | DPS1101 SS | £1.60 | £1.30 | £1.20 |
| | DPS1101 MS | £2.50 | £2.10 | £2.00 |
| | DPS1101 Corr | £1.80 | £1.50 | £1.40 |
| CENTRONICS | GLP | £3.70 | £3.20 | £3.00 |
| CITIZEN | 120D | £5.00 | £4.60 | £4.30 |
| DAISYSTEP | 2000 MS | £3.10 | £2.60 | £2.40 |
| | 2000 FAB | £4.90 | £4.20 | £4.00 |
| EPSON | MX/FX/RX80 Black | £3.00 | £2.60 | £2.40 |
| | MX/FX/RX80 Red or Blue | £4.20 | £3.50 | £3.30 |
| | 100 Series | £5.00 | £4.60 | £4.30 |
| | LX80/LX86 | £3.00 | £2.60 | £2.40 |
| | JX80 Colour. One Off | | | £18.50 |
| | LQ800 | £3.90 | £3.50 | £3.30 |
| | LQ1500 | £4.50 | £3.90 | £3.60 |
| JUKI | 6000/2200 FAB | £3.70 | £3.40 | £3.20 |
| | 6000/2200 Corr | £4.00 | £3.60 | £3.40 |
| | 6000/2200 SS | £3.10 | £2.70 | £2.50 |
| | 6100 MS | £2.50 | £2.10 | £2.00 |
| | 6100 SS | £1.60 | £1.30 | £1.20 |
| | 6100 Corr | £1.80 | £1.50 | £1.40 |
| KAGA | KP810 Black | £3.40 | £2.90 | £2.70 |
| | KP810 Red or Blue | £5.30 | £4.70 | £4.40 |
| M/TALLY | MT80 | £4.00 | £3.20 | £3.00 |
| OKI | 80/82 | £1.60 | £1.30 | £1.20 |
| | 84 | £3.90 | £3.40 | £3.20 |
| | Mate 20 Colour | £7.00 | £6.50 | £6.20 |
| | Mate 20 Black | £6.60 | £6.20 | £6.00 |
| PANASONIC | KX1091/2 | £5.00 | £4.60 | £4.30 |
| QUENDATA | DWP1120 MS | £3.10 | £2.60 | £2.40 |
| | DWP1120 FAB | £4.90 | £4.20 | £4.00 |
| QUME | Sprint 7/9 MS | £3.10 | £2.60 | £2.40 |
| | Sprint 7/9 FAB | £4.90 | £4.20 | £4.00 |
| SEIKOSHA | GP50 | £6.00 | £5.50 | £5.20 |
| | GP80 | £2.95 | £2.40 | £2.30 |
| | GP100/250 | £2.95 | £2.40 | £2.30 |
| | GP500/550 | £3.90 | £3.30 | £3.10 |
| | GP700 Colour. One Off | | | £18.50 |
| | SP1000 | £6.00 | £5.50 | £5.20 |
| SHINWA | CP80 | £4.00 | £3.20 | £3.00 |
| SMITH | TPI M/S | £8.50 | £7.90 | £7.20 |
| CORONA | TPI Fabric | £3.90 | £3.60 | £3.40 |
| | TPI Corr | £5.00 | £4.70 | £4.50 |
| | D100/200 | £9.00 | £8.50 | £8.20 |
| | D300 | £6.00 | £5.50 | £5.30 |
| STAR | DP/GEMINI/SG | £1.60 | £1.30 | £1.20 |
| | SR15 | £4.90 | £4.50 | £4.30 |
| | NL10 | £5.60 | £4.90 | £4.60 |

### FLOPPY DISKS

| 5¼" | | BOXES OF 10 DISKS 1-2 | 3-9 | 10+ |
|---|---|---|---|---|
| **JVC inc Plastic Case** | | | | |
| MD-1D | S/side D/dens 40TR | £9.99 | £9.50 | £9.25 |
| MD-2D | D/side D/dens 40TR | £11.99 | £11.50 | £11.25 |
| MD-2DD | D/side Q/dens 80TR | £15.99 | £15.50 | £15.25 |
| MD-2HD | D/side H/dens 1.6MB | £26.99 | £25.99 | £25.49 |
| **VERBATIM – DATALIFE** | | | | |
| MD525 | S/side D/dens 40TR | £11.99 | £11.75 | £11.49 |
| MD550 | D/side D/dens 40TR | £14.99 | £14.75 | £14.49 |
| MD577 | S/side Q/dens 80TR | £14.99 | £14.75 | £14.49 |
| MD557 | D/side Q/dens 80TR | £19.99 | £18.99 | £18.50 |
| MD HD | D/side H/dens 1.6MB | £27.99 | £26.99 | £25.99 |
| **SONY** | S/side D/dens 40TR | £12.49 | £11.99 | £11.75 |
| | D/side D/dens 40TR | £15.49 | £14.99 | £14.75 |
| | D/side Q/dens 80TR | £20.49 | £19.99 | £19.75 |

| 3½" | | BOXES OF 10 DISKS | | |
|---|---|---|---|---|
| JVC | S/side D/dens | £17.99 | £17.25 | £16.99 |
| SONY | S/side D/dens | £18.99 | £18.25 | £17.99 |
| SONY | D/side D/dens | £27.99 | £27.50 | £26.99 |

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|---|---|---|
| 10 x Disks | £1.99 each | £19.90 pack |
| 20 x Disks | £1.89 each | £37.80 pack |
| 50 x Disks | £1.79 each | £89.00 pack |

**3" DISKS**

| | | |
|---|---|---|
| CF2 5 Disks | £3.25 each | £16.25 pack |
| CF2 10 Disks | £2.99 each | £29.90 pack |

### ENVELOPES

| | BOXED | PRICE PER BOX |
|---|---|---|
| 110mm x 220mm White Self Seal 90gsm | 500 | £11.50 |
| 110mm x 220mm Manilla Banker Gummed 70gsm | 500 | £9.50 |
| 324mm x 229mm Manilla Self Seal 90gsm | 250 | £17.90 |

### DISK STORAGE

| MODEL | SIZE | CAPACITY | PRICE |
|---|---|---|---|
| **LOCKABLE DISK BOXES** | | | |
| DD40L | 3"/3.5" | 40 | £8.90 |
| MD60T | 3"/3.5" | 60 | £12.50 |
| DD50 | 5¼" | 50 | £8.90 |
| DD70 | 5¼" | 70 | £10.90 |
| DX85 | 5¼" | 90 | £12.90 |
| DD100 | 5¼" | 100 | £13.90 |
| LIBRARY CASE | 5¼" | 10 | £1.50 |
| **NON-LOCKABLE DISK BOXES** | | | |
| MD12/30 | 3"/3.5" | 24 | £7.20 |
| MF50 | 5¼" | 50 | £8.00 |
| **MICRODRIVE HOLDERS** | | | |
| WALLET | | 4 | £1.75 |
| WALLET | | 20 | £4.50 |

### PRINTER CABLES & INTERFACES

| | | |
|---|---|---|
| AMSTRAD | Parallel | £8.90 |
| ATARI ST | Parallel | £14.50 |
| BBC | Parallel | £6.50 |
| IBM | Parallel | £14.50 |
| MSX | Parallel | £10.90 |
| CBM 64/128 | Parallel I/F | £59.90 |
| SINCLAIR QL/SPEC 128 | Parallel I/F | £26.50 |
| SINCLAIR SPECTRUM | Parallel I/F | £32.50 |
| AMSTRAD PCW | Parallel/Serial I/F | £49.90 |

### COMPUTER STATIONERY

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| SIZE | GSM | QUANTITY | PRICE 1 BOX | 2 BOXES |
|---|---|---|---|---|
| 11 x 9½ | 60 | 2000 | £12.90 | £12.00 |
| 11 x 9½ | 70 | 2000 | £15.90 | £14.50 |
| EXACT A4 | 70 | 2000 | £21.50 | £18.75 |
| 11⅔ x 9½ | 90 | 1000 | £13.50 | £11.25 |

### COMPUTER LABELS

| | PRICE PER THOUSAND 1000 | 2000+ |
|---|---|---|
| 70 x 36mm | £4.40 | £4.00 |
| 89 x 36mm | £4.50 | £4.10 |
| 89 x 49mm 3 across only | £6.20 | £5.70 |
| 102 x 36mm | £4.70 | £4.40 |

Please state number of labels across sheets (1, 2 or 3).

### PRINTERS

| | |
|---|---|
| Epson LX86 | £209.95 |
| Epson FX800 | £329.00 |
| Epson FX1000 | £419.00 |
| Epson EX800 | £386.95 |
| Epson LQ800 | £454.95 |
| Epson LQ1000 | £607.95 |
| Citizen 120D | £155.95 |
| Amstrad DMP2000 | £139.95 |
| Amstrad DMP3000 | £152.95 |
| Brother 1509 | £416.95 |
| Oki-mate 20 Colour | £169.95 |
| Micro P MP165 | £199.95 |
| Seikosha SP1000A | £199.95 |
| Seikosha MP1300A | £349.95 |
| Star NL10 inc I/F | £199.95 |
| Star SG15 | £299.95 |
| Star SD10 | £299.95 |
| Star SD15 | £429.95 |
| Star Powertype Daisywheel | £199.95 |
| Juki 6100 | £249.95 |

### COMPUTERS

| | |
|---|---|
| Acorn BBC Master | £399.95 |
| Acorn BBC Master Compact | P.O.A. |
| Amstrad PCW8256 | £389.95 |
| Amstrad PCW8512 | £489.95 |
| Amstrad CPC464 Green | £169.95 |
| Amstrad CPC464 Colour | £254.95 |
| Amstrad CPC6128 | £254.95 |
| Amstrad CPC6128 Colour | £339.95 |
| Atari 520STM + 500K D. drive | £369.95 |
| Atari other models | P.O.A. |
| Commodore C64 | £139.95 |
| Commodore C64C compend. | £204.95 |
| Commodore C128D | £429.95 |
| CBM 1541C Disk Drive | £168.95 |
| CBM Amiga | P.O.A. |
| Sinclair Spectrum 128K + 2 | £128.95 |

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**BASF 5¼" 2D/96**
**D/side Q/dens 80TR**
Box of 10 (min. 2 boxes)
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I wish to order ____________________

My computer is ____________________

I enclose cheque/PO for £ ____________ inc VAT
or charge my Access/Visa No: ____________________

Name ____________________

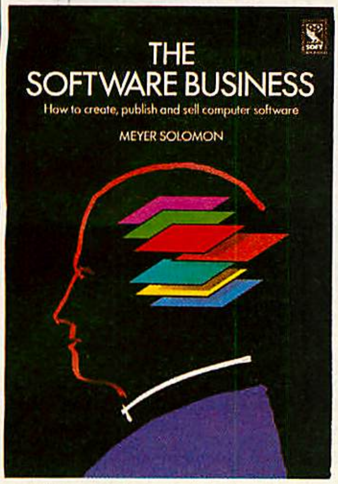
Signature ____________________

Address ____________________

Postcode ____________ Tel No: ____________

Ac. U. 1/87

## News in brief




● 'The Software Business — How to create, publish and sell computer software' by Meyer Solomon, is a new book which costs £5.50 from BBC Soft, 35 Marylebone High Street, London, W1M 4AA. Tel: 01-580 5577.

● The Bradford Bulletin Board runs 24 hours a day on a BBC micro and offers access at 300/300 and 1200/75 baud, providing colour for BBC micro users and having two closed user groups for Beeb and Amstrad owners. Contact (0274) 480452.

● 'Dwarven Realm', a new Norfolk bulletin board catering especially for BBC micro owners, is open 24 hours a day with access at both 300/300 and 1200/75 baud rates. Contact them on (06053) 2949.

● The first Information and Communication Technology Exhibition is to be held on 17 — 19 February at the Aberdeen Exhibition and Conference Centre. Details from Don-Mor Productions, 2 West Mount Street, Aberdeen, AB2 4RJ. Tel: (0224) 631372.

● Musical Beeb owners can accompany themselves with a drums and bass backing track from Rice Computers' upgraded drum synthesiser. The waveforms are micro generated and can be displayed and edited on screen. The combined synthesiser costs £85 from Rice Computers, PO Box 2, Morecambe, Lancs, LA4 4PP.

# ITV to launch £4.95 school database

ITV has burst onto the software market with *Key* — a database package for schools with graphics, chart-plotting, Venn diagram and correlation capabilities for the astounding price of £4.95 including VAT.

*Key* can be used with primary children as the more complex facilities are not seen once the database has been set up. Users access and manipulate text or numerical information by a series of simple menus driven by just three keys.

Brian Nixon, education officer for Granada TV, who developed *Key* with the software house GSN, said it was designed to be easy to use, fast, and be able to handle picture files and work with other databases. He felt all these aims had been met, but schools would be the ultimate judges.

Peter Stibbons of Anglia added: 'The biggest users will be in primary schools, but *Key* has hidden depths to suit even the sixth form as well.'



***Key* in action on two BBC micros. The far one shows the graphics with a map showing geographical distribution of the placenames data, and the near one a standard menu.**

Schools will be able to set up their own databases, but *Key* will accept data in either ASCII or FIF standard formats. ITV will have a placenames data disc for the pack costing £1.95. Brian Nixon hoped that all the ITV companies would follow up with data relevant to their region and keep records on databases set up by schools.

*Key* will be available on 40-track disc for BBC B/B+ and Master on January 14 1987 from ITCA Ltd, 6 Paul St, London EC2A 4JH.

## System Delta link to Inter suite

Minerva Systems has released *InterLink*, a package to link programs written with its System Delta database programming language to Computer Concepts' *InterWord*, *InterSheet*, and *InterChart* ROM chips.

Using *InterLink*, data from a System Delta database can be transferred to the *Inter* programs for use in graphs, spreadsheet or wordprocessor. The provisional price of *InterLink* is £19.95.

Minerva has also released another applications package for System Delta. *School Administrator* uses the System Delta ROM to implement what Minerva claimed is 'the most flexible schools administration program available'.

Records of over 2,500 pupils' names, addresses, age, next of kin, etc, and details of all exam subjects, dates, times and results can be stored, enabling detailed reports on the pupils' or school's performance to be created.

The package costs £69.95 from Minerva, Sidewell Street, Exeter, Devon, EX4 6PH.

## Assembler help from Ceefax

The BBC Telesoftware service is to branch out with programming tuition.

BBC micro owners with a Teletext adapter will be able to receive a series of articles and example software to help them master assembly language.

The series, called 'Osbits', starts in early January and continues for 26 weeks. Like all Telesoftware, articles can be viewed and programs downloaded free, from page 700 in BBC2 Ceefax.

Further details from BBC Telesoftware Service, BBC Enterprises, Woodlands, 80 Wood Lane, London W12 OTT.

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## Computers

**MASTER 128**

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|---|---|
| Complete With Internal Software | £454.25 |
| Master Turbo Upgrade | £113.95 |
| Master 512 Upgrade | £389.00 |
| Master SC Upgrade | T.B.A. |
| Eprom Cartridge | £14.95 |
| Reference Manual Part I | £14.95 |
| Reference Manual Part 2 | £14.95 |
| 6502 Second Processor | £179.00 |
| Z80 Second Processor | £379.00 |
| Acorn Prestel Adaptor | £125.00 |
| Acorn Teletext Receiver | £135.00 |
| Winchester Disk Drive 10 MBYTES | £1250.00 |
| Winchester Disk Drive 30 MBYTES | £1850.00 |
| IEEE Interface | £299.00 |

**ECONET ACCESSORIES**

| | |
|---|---|
| 100m Cable | £89.00 |
| Station Lead Set | £29.00 |
| Econet Starter Kit | £99.00 |
| Econet Bridge | £199.00 |
| Level I Fileserver 40 Track | £99.00 |
| Level 2 Filesaver 80 Track | £235.00 |
| Print Server Eprom | £49.00 |

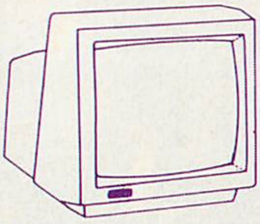
## BBC Upgrades

| | |
|---|---|
| 64K Upgrade Kit | £39.95 |
| 17/70 Upgrade Kit | £49.94 |
| ADFS ROM | £29.95 |
| Disc Upgrade Kit | £89.00 |
| Econet Upgrade Kit | £49.00 |
| Speech Upgrade Kit | £49.00 |
| DNFS ROM | £20.00 |

## Monitors

**MONOCHROME MONITORS**

| | |
|---|---|
| Phillips BM 7502 Green Screen | £79.00 |
| Phillips BM 7522 Amber Screen | £95.00 |
| Kaga KX 1202G Hi Res Green | £120.00 |
| Kaga KX 1203G Ultra Hi Res Amber | £120.00 |



Hantarex H x 12 Dark Gloss Screen high resolution monochrome monitor 12" Composite Video & Audio input **£75.00**

**COLOUR MONITORS**

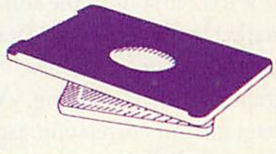
| | |
|---|---|
| Microvitec 1431 Std Res | £201.25 |
| Microvitec 1451 Med Res | £270.25 |
| Microvitec 1441 Hi Res | £391.00 |
| Microvitec 2030 Cs 20 Std Res | £425.50 |
| Microvitec 1431 AP Std Res | £224.25 |
| Microvitec 1451 Ap Med Res | £293.25 |

**TV MONITORS**

Philips 1114 colour TV/monitor with 14" tube offering 10 Preselect channels RF CVBS and RGB inputs **£199.00**

**SWIVEL BASE**

Tilt and swivel base for 12" or 14" monitor or TV. "Looks very elegant" **£17.25**



**PHILIPS MONITOR TO TV CONVERTER £69.00**

HOW TO TURN A DEDICATED MONITOR INTO A FIRST CLASS TV SET?
SIMPLY SLIDE THE SWITCH ON THE TV TUNER.
The Philips AV 7300 TV tuner turns any colour monitor (with CVBS and audio inputs) into a first class TV set, giving you extra versatility and value from your monitor. A convenient TV/computer switch allows the tuner to stay permanently connected to the computer and at the same time to a TV antenna.

## TCL WORD PROCESSING SPECIAL PACKAGE

**PACKAGE 1**

Based on Master 128. The TCL All in One Word Processing Package contains a Master 128, View 3.0, Viewsheet, High Res Green Monitor, 800K Dual Drives with PSU, Quendata Daisy Wheel Printer together with a box of Discs, Paper, and all the Cables. **£914.25**

**PACKAGE 2**

Based on Master Compact 128. The TCL package includes Compact 128, latest version of the View Word processor, single 640K disk drive, monochrome monitor, correspondence quality printer. All connecting cables for above and also 5 disks and some paper. **£635.00**



*Happy New Year!*

## YOUR ONE STOP MEGA-COMPUSTORE FOR

## BBC MASTER COMPACT




Twillstar proudly presents MASTER COMPACT for your Home Education and Business needs! Complete with bundled software and an integral 3.5" Disk Drive in the following Systems:-

**SYSTEM 1** (inc. VAT) **£458.85**
*128K* *Single 640K Drive* *UHF Modulator* *Bundled Software*

**SYSTEM 2** (inc. VAT) **£539.35**
As System 1. With *12" High Res. Monochrome Monitor*

**SYSTEM 3** (inc. VAT) **£688.85**
As System 1. With *14" Medium Res. RGB Monitor*

**SPECIFICATIONS:** ★ Compatible with Master Series micro subset ★ 128K RAM inc 64K sideways RAM ★ 64K ROM inc 32K MOS, 16K BASIC ★ Up to 4 internal ROM sockets ★ 3.5" 640K formatted disk drive ★ OUTPUTS: Video/RGB/Printer/ Mouse or Joystick ★ Disk drive ★ (optional) Econet ★ Serial ★ 5V power from disk drive module ★ Usual 8 BBC disply modes inc. Mode 7 ★**BUNDLED SOFTWARE:** Pull down menus * Desk top inc. note pad, calculator * VIEW 3.0 * CARD INDEX * Full LOGO * BBC BASIC 4.0 * ADFS + Utils * Welcome suite * Tutorials * (1770 DFS under licence)

**2nd DRIVE KIT** **£113.00**

**MASTER COMPACT OFFER**

A free box of 3½" disks worth £30.00 with evey BBC Master Compact System purchased.

Phillips CM 8533 Med Res monitor with dark glass etched screen composite video input RGB and Audio Input. **£289.00**

**Taxan Super Vision *II***



monitor at an affordable price.
SUPERVISION *II*
12" RGB High resolution colour monitor. Fully compatible with IBM, Apple, BBC and most other Personal Computers. 635 x 312 line resolution. Positive or negative sync input. Text colour switchable to green, amber, white or blue or inverse white. Super high contrast tube. Optional tilt-swivel base (with clock/calendar available). Special introductory offer. **£299.00**

**OUTSTANDING PERFORMANCE OUTSTANDING VALUE**

Just released by Hantarex 14" Colour Monitor Standard Resolution RGB PAL Audio Input (Inc. VAT) **£175.00**

**SPECIAL OFFER**

Mitsubishi 1404 Medium Resolution Monitor with 640 X 200 Pixels RGB available with IBM or BBC Leads. **£229.00**

## Disc Drives

**MITSUBISHI DISC DRIVES**

User Friendly Disk Drives 100% BBC compatible slimline disc drives. All drives are supplied complete with formatting diskette, comprehensive users manual and all necessary cables. All drives are 40/80 Track switchable at the front and have two years warranty.

**5¼" Drives without P.S.U.**

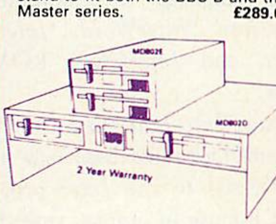
| | |
|---|---|
| MD 400A Single 400K Double Sided | £118.00 |
| MD 802C Dual 400K Double Sided | £219.00 |

**5¼" Drives with P.S.U.**

| | |
|---|---|
| MD 400B Single 400K Double Sided | £135.00 |
| MD 802E Dual 400K Double Sided | £249.00 |

**SPECIAL**

MD 802D Dual 400K Drives horizontally mounted in a monitor stand to fit both the BBC B and the Master series. **£289.00**




**visit our NEW SHOWROOM**
**Open 9am-6pm Mon-Sat**
**OPEN SUNDAYS 10-2**



## Printer Accessories

**SERIAL INTERFACES**

| | |
|---|---|
| EPSON 8143 | £34.00 |
| JUKI | £58.00 |
| CANON | £91.00 |
| KAGA | £85.00 |
| Epson 8148 + 2K buffer | £65.00 |

**LISTING PAPER**

| | |
|---|---|
| 11" × 9½ 2000 Sheets | £14.00 |
| 1000 Sheets | £7.00 |
| 500 Sheets | £3.50 |
| Teleprinter Roll (Telex size) | £4.50 |
| Teleprinter Roll Holder | £14.00 |
| Printer Roll 5" × 2½" | £2.00 |

**PRINTER LABELS**

| | |
|---|---|
| 1000 90 × 36mm 1 across | £5.70 |
| 2000 90 × 36mm 2 across | £12.00 |

**PRINT FEED SYSTEM**

Revolutionary low cost Printer Feed System tidies up all Micro Desks—No more paper on the floor.

| | |
|---|---|
| 80 Col | £35.00 |
| 132 Col | £55.00 |

**RIBBONS**

Full selection of Ribbons available. Call for latest prices.

**PRINTER SHARERS**

| | |
|---|---|
| Printer Sharer (2 to 1) | £39.00 |
| Printer Sharer (6 to 1) | £79.00 |

**EXTERNAL SWITCHES**

| | |
|---|---|
| Spectrum parallel interface | £40.25 |
| QL Serial/parallel interface | £27.60 |
| CBM 64 parallel interface | £19.95 |

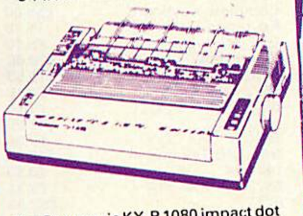
**COMPUTER CABLES**

Call for full listing of our vast stock.

# ▾ Printers ▾

## KX-P 1080 DOT MATRIX PRINTER

- NEAR-LETTER QUALITY PRINTING IN ALL PITCHES
- OPERATOR ACCESSIBLE PRINT MODE SELECTOR (Std./Pgm.,NLQ, Comp.)
- FRICTION FEED AND ADJUSTABLE TRACTOR ARE STANDARD
- WORD PROCESSING FUNCTIONS (Justification, Centering, L&R alignment)
- PROPORTIONAL SPACE PRINTING
- HIGH RESOLUTION, DOT-ADDRESSABLE GRAPHICS
- UP TO 40 DOWNLOADABLE CHARACTERS
- COMMAND CODE COMPATIBLE WITH POPULAR PRINTER SOFTWARE
- PRINT SPEED, DRAFT: 100 NLQ: 20 COMPRESSED: 86
- 9 PIN PRINT HEAD



The Panasonic KX-P 1080 impact dot matrix printer is ideal for applications that require economical high quality printing. It offers a variety of print modes, all producing crisp clearly formed characters. Wide choice of print sizes include semi -compressed and commpressed (even in near-letter quality printing). Operator accessible print mode selector adds convenience. For a reliable printer at an affordable price, the KX-P 1080 is always a smart choice. **£159.00**



## STAR NL-10

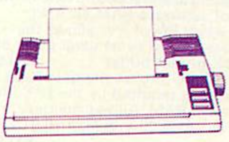
Fine Near-Letter-Quality, 100% compatibility and total reliability all in one easy to use printer. For quality, ease of operation and dependability, nothing beats the Star NL-10. You get outstanding print quality at 120 cps in draft mode and 30 cps in near letter quality. Plus, the sleek NL-10 offers full compatibility with most popular computers through plug in interface cartridges. Just insert the appropriate plug in interface cartridge for your IBM-PC, Commodore, Apple IIc or other parallel computer and your Star NL-10 is ready to print. Touch a button on the control panel to set the print pitch (3 choices), to select the typeface and to print in either draft or NLQ mode. You can even set left and right margins, make top of form settings and control forward and reverse feed in the smallest pitch. **£229.00**



## BROTHER M1109 NLQ

Printer 100cps Directional Logic Seeking Friction feed and secondary optional tractor feed **£189.00**





## EPSON LX86

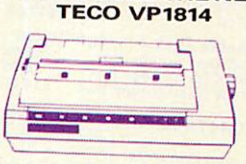
High performance low on price offering an increased performance at an incredible low price. The LX 86 Dot Matrix Printer represents unprecedented value for money, with a host of built in features, increased draft speed 120 cps and correspondence quality at 16 cps printing this versatile Epson printer carries out every task with effortless style and has the highest standard of reliability. Supports both Epson and IBM character set. (inc VAT)£229.00

## ALSO AVAILABLE

| | |
|---|---|
| Epson FX 86 | £365.00 |
| Epson FX 105 | £495.00 |
| Seikosha GP 50A (Parallel) | £69.00 |
| Seikosha GP 50S inc. Printer I/F + cables | £69.00 |
| Canon 50A | £269.00 |
| Canon 55A | £399.00 |
| Brother EP 44 | £228.00 |
| Shinwa CP 80A | £189.00 |
| MP 165 | £240.00 |

## SOURCE
### The Complete Solution

**INTRODUCES THE NEW TECO VP1814**



Dot matrix printer. VP1814 is fast highly reliable and easy to operate.

☆ Standard 80 column
☆The high-speed, low energy consumption 9 wire dot head gives printing speed of 189 cps and NLQ speed 36 cps
☆Bi-directional, Logic seeking in text mode
☆The use of fan-fold, roll or cut-sheet paper is possible with adjustable sproket pin feed and friction feed
☆Offers emphasized, double print, super script, sub script
☆Justified print mode are also available including left, centre, right and full justification
☆9 graphic modes are available
☆Both download and inprint buffer can exist simultaneously
☆7K input buffer standard can be expanded to 15K
☆Printing modes selectable at front panel (NLQ/draft, Pica/Elite, enlarge, emphasize, condense, italic
☆11 Language international character font is internalized
☆Both IBM and Epson compatable

MAIN UK DISTRIBUTOR
SPECIAL INTRODUCTORY PRICE
(inc. VAT) **£229.00**

# HOME, EDUCATION & BUSINESS NEEDS!

## DOT MATRIX PRINTERS

**Juki 5510 - Gives you 180 CPS & NLQ Standards**
**£269.00 Inc. VAT**

...and thats not all! The Juki 5510 also has full graphics mode, two position 'dip-switch' (providing instant compatibility with both the Epson and the IBM Graphic Printer). Standard 2K memory (expandable to 14K) built-in Parallel Centronics interface and 8-switch international character sets. If you need colour too, the optional Juki 5510 Colour Kit gives you seven colours. **£112.00**

## CITIZEN MSPIOE

The new MSPIO with 160 CPS Draft and 40 CPS NLQ. With TWO years Warranty **£269.00**

## STAR NB-15

High performance quality printer 300 cps draft, 100 cps LQ. 136 columns. Friction and tractor feed. Standard parallel interface. **£859.00**

Range of Courier fonts available, e.g. Courier font Orator font, Courier Italic font, Prestige Italic font, Letter Gothic font. **each £39.00**

| | |
|---|---|
| Auto sheet feeder optional | £195.00 |
| 8K RS232 Interface | £85.00 |
| 16K Parallel Interface | £99.00 |

**ALL ITEMS LISTED INCLUDE VAT AT 15% 'NO HIDDEN EXTRAS'**

## CANON COLOUR PRINTER PJ - 1080A
**£440.00**

Features Include: . 7 colour Drop-on-demand Ink Jet . 37CPS Bi-directional printing . Hi-resolution Graphics . Very quiet, less than 50dB . Will print on film for overhead projection . Long life ink cartridges 3.5 million characters per colour . Very compact and lightweight . 8-bit Parallel Interface - Epson compatible Easily replaced colour cartridges . Accepts single sheets . International character sets . Compatible with Symphony symphony, Execuvision.

## CANON PW1080A

80 column printer with 160 cps draft and 40 cps NLQ with built in friction and tractor feed. Fully compatible with Epson FX80. Standard parallel interface. **£235.00**

## EPSON EX 800

300 cps draft, 50 cps NLQ. Four built in fonts including 2 letter quality fonts which can be printed in a variety of type styles, standard, parallel and serial interface. Friction and tractor feed. Four colour printer option is also available. **£589.00**

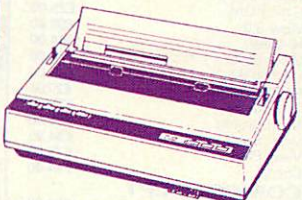
## EPSON LQ800

24 Pin Dot Matrix Printer offers a high 200 CPS draft speed and near letter quality at 67 CPS with high resolution graphics and a variety of fonts **£585.00**

## DAISYWHEEL PRINTERS

QUENDATA DWP 1120 with optional tractor/sheet feeder and 13" paper width facility. This Daisywheel printer with 20 CPS has 96 character printwheel compatible with the QUME. Standard centronics interface. (optional RS232 C) **£169.00**

| | |
|---|---|
| Juki 6100 | £285.00 |
| Juki 2200 | £275.00 |
| Juki 6300 | £799.00 |



## PANASONIC KX-P3131

A Fully Formed Serial Impact Daisywheel printer with print speed of 17cps. Diablo compatible print wheels. Print pitches available are: 10, 12, 15 and proportional spacing. Standard friction feed and optional tractor. Paper width 13.5 inches. Standard Centronics optional RS-232C. Built with 6K text buffer expandable to 32K buffer. **£289.00**

## CITIZEN MSP-15E

17" Wide carriage . 136 column, operating at 160 cps and at the push of a switch will print near letter quality at 40 cps. Fully Epson and IBM compatible. 8k of standard buffer built in. Standard Centronics are optional RS232 **£379.00**

## COLOUR PRINTERS

| | |
|---|---|
| Canon PJ1080A | £440.00 |

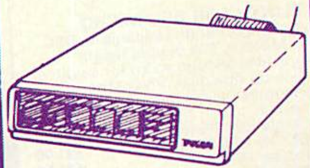
## TRACTOR ADAPTERS

| | |
|---|---|
| FX85 | £33.00 |
| LX80 | £23.00 |
| Juki 6100 | £129.00 |
| Juki 6300 | £129.00 |
| Quendata DWP 1120 | £114.00 |
| Brother HR 15 | £95.00 |
| LQ 800 | £43.00 |

## SHEET FEEDER

| | |
|---|---|
| Juki 6100 | £173.00 |
| Juki 6300 | £173.00 |
| Quendata DWP 1120 | £165.00 |
| Brother HR 15 | £212.00 |
| LX80 | £55.00 |

## Printer Buffer



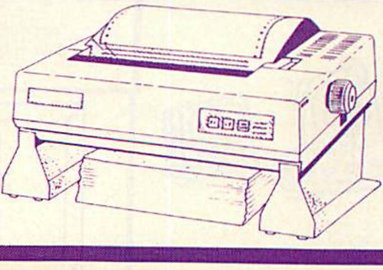
Now available
Taxan Multipurpose Type Printer Buffer KIF-4308 compatible with any Centronics interface printer **£149.00**

# PRINTER STAND



£18.00 Inc. VAT

CONSTRUCTED FROM STEEL SO WILL NOT BEND OR BUCKLE
WORKS WITH BOTH CENTRE AND BACK FEED PRINTERS
POSITIONS PRINTER TO GIVE SUPERB VIEWING ANGLE
REVERSED THE STAND BECOMES IDEAL FOR COMPUTERS AND MONITORS
ADJUSTABLE TO NEARLY ALL PRINTERS
SAVES SPACE AND GIVES PAPER STORAGE
FOAM PADS PREVENT VIBRATION AND SCRATCHING OF DESK TOPS



# Accessories

Raven Discs Double Sided, Double Density 96 TPI uses 3M media. Guaranteed for life. Free library Box included £17.00

**Lockable Disk Storage Boxes**

| | |
|---|---|
| 40*3½ Disk Sorage Box | £6.99 |
| 70*5¼ Disk Storage Box | £9.95 |
| 100*5¼ Disk Storage Box | £14.00 |

**NIGHTINGALE MODEM**

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them

| | |
|---|---|
| Including Commstar and Comprehensive Manual | £130.00 |
| Auto Dial/Auto Answer Board | £55.00 |
| Auto Dial Utilities Disc | £11.00 |
| OBBS Bulletin Software | £23.00 |

**EPROMS**

| | |
|---|---|
| 2764 | £2.20 |
| 27128 | £3.95 |

**RAMS**

| | |
|---|---|
| 6264 LP 15 | £3.95 |
| EPROM Extactor | £5.00 |
| EPROM Eraser | £32.00 |
| Soft Life EPROM Blower | £75.00 |

**GRAPHPAD 2**

Draw and Paint in numerous colour and pattern combinations. Copy, invert, mirror and flip any part of your picture. Define your own symbols and colour patterns. With new System 1 ROM Art Software only £69.00

**JOYSTICKS**

| | |
|---|---|
| Voltmace 14b Handset | £14.95 |
| 3b Singlet | £12.95 |
| 3b Duelset | £19.95 |
| 14b Interface | £14.95 |
| DRAWER Cassette | £5.95 |
| DATAPAD Keyboard | £39.95 |

**SYSTEM SOFTWARE**

| | |
|---|---|
| THE MUSIC SYSTEM | |
| Disk Pack | £29.95 |
| Cassette 1 | £14.95 |
| Cassette 2 | £14.95 |

**EXPANSION BOARDS**

Sidewise, ROM/RAM Expansion for the BBC Micro £42.00
Battery back up kit £18.00
CMOS RAM 8K Bytes £5.00
Sideways Plus ROM board for the new BBC B+ computer £36.00
Range of software specifically designed to enhance and extend the use of sideways RAM an ATPL Sideways. Spool it – allows the sideways RAM to be used as an 8K or 16K printer buffer £11.50
DFS Shift – moves the user RAM workspace required by the DFS into sideways RAM. Allows memory recovery to 0E00 with Acorn 0.9 DFS only £11.50
Sideswipe – allows you to save sideways ROM onto disc and load sideways ROMS from disk into RAM. £11.50
Turboprom – 1-2 uses a fast programming algorithm to greatly reduce programming time of EPROMS (14 mins - 2 mins). Used with Autoprom available on disc or Sideways ROM £17.00
Custom RAM/ROM writer utility to produce a ROM image for Autoprom or Sideways RAM to automatically download and run a Basic programme and/or your utilities on power up. Several utilities supplied with this package. Please specify 40T, 80T disc or cassette. £17.00

**BBC BOOKS**

| | |
|---|---|
| BBC B Compendium | £5.95 |
| Advanced Disk User Guide | £14.95 |
| Advanced Basic Rom User Guide | £9.95 |
| The Epson FX Kaga Printer Commands Revealed | £5.95 |
| BBC Micro Disk Drives | £6.95 |
| Complete Disk Manual | £7.95 |
| The BBC Micro Rom Book | £9.95 |
| The Super User's BBC Micro Book | £9.95 |
| View BBC | £10.00 |
| View Store | £10.00 |
| Viewsheet Electronic S/Sheet BBC | £10.00 |

| | |
|---|---|
| Clares Betabase | £23.00 |
| Clares Graphdisk | £12.30 |
| Clare Replica III Disk | £13.50 |
| Clares the Key Disk | £12.30 |
| Betabase | £21.00 |
| Betabase Utilities | £11.00 |
| Beta Accounts | £21.00 |
| Profile | £11.00 |
| Font Editor | £17.00 |
| Fontwise Plus | £17.00 |

**BEEBUG**

| | |
|---|---|
| Toolkit Plus | £35.00 |
| Wordease ROM | £22.00 |
| Wordease Disc | £19.00 |
| ICON Master | £30.00 |
| Studio Eight | £19.00 |
| ROMIT | £30.00 |
| Sleuth ROM | £28.00 |
| Exmon 2 | £28.00 |
| Help 2 | £27.00 |
| Spellcheck 3 | £32.00 |
| Dumpmaster 2 ROM | £27.00 |
| Dumpmaster Disk | £13.00 |
| Program Bulder | £19.00 |
| Discmaster | £19.00 |
| Teletext | £13.00 |
| Sprites | £13.00 |
| Murom | £28.00 |
| Quickcalc | £16.00 |
| Hershey Font | £19.00 |
| Billboard | £21.00 |
| Design | £21.00 |
| Paintmaster | £15.00 |

**ALTRA**

| | |
|---|---|
| Enigma Disk Imager | £42.00 |
| Tube Editor | £42.00 |
| Probe I | £34.00 |
| Basic Editor 2 | £34.00 |
| Basic Editor I | £25.00 |
| First Aid II | £19.00 |

**MICROSOFT**

| | |
|---|---|
| Fleet Street Editor | £39.95 |
| F. S. Walt Disney Library | £14.95 |
| F. S. Font's 'n' Graphics | £14.95 |
| F. S. Admin Extra | £14.95 |

**P.M.S.**

Multifont Near Text Quality & typesetting software. Very sophisticated font design software for Epson compatible printers. 2 Roms & utility disk £34.00



# Services

Many components now in stock. Call for details and price.

**SERVICES**

| | |
|---|---|
| Fast Repair Service for the BBC Computer average charge from | £23.00 |
| Printer repairs from | £20.00 |
| Disk Drive repairs from | £15.00 |

**BBC COMPUTER SPARE PARTS AND COMPONENTS**

| | |
|---|---|
| PSU | £59.00 |
| Keyswitch | £2.00 |
| Complete Keyboard | £59.00 |
| Keyboard Connector | £5.18 |
| UHF Modulator | £5.18 |
| Video ULA | £20.00 |
| Serial ULA | £16.00 |
| 6522 VIA | £4.10 |
| 6502 2 MHZ CPU | £7.50 |
| UPD 7002 | £17.25 |
| 6845SP CRT CON | £7.50 |
| SAA 550 Teletext | £10.35 |
| LM 324 | £0.50 |
| 6522A 2 MHZ VIA | £6.33 |
| 8271 | £52.00 |
| 74 LS 123 | £0.46 |
| 74 LS00 | £0.28 |
| 74 LS04 | £0.28 |
| 74 LS10 | £0.28 |
| 7438 | £0.46 |
| 74 LS 163 | £0.86 |
| 74 LS 244 | £0.92 |
| 74 LS 245 | £1.27 |
| 74 LS 375 | £1.04 |

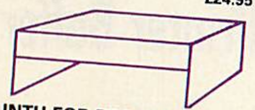
# TWILLSTAR COMPUTERS LTD

**RED BOX**

Home Security/Home Automation £129.00

**AMX MOUSE & SOFTWARE**

| | |
|---|---|
| AMX Mouse with Super Art ROM | £79.00 |
| AMX Mouse with Super Art ROM Master | £89.00 |
| AMX Pagemaker BBC/Master | £49.95 |
| AMX 3D Zicon | £24.95 |
| AMX Database | £24.95 |
| AMX XAM | £24.95 |
| The Original AMX art Plus Utilities | £14.95 |
| AMX Paintpot | £14.95 |
| AMX Desk | £24.95 |



**PLINTH FOR BBC MICRO**

The single Plinth is suitable for BBC & Monitor. The double height provides enough room for single or side by side dual drives. The computer slides in to the lower section

| | |
|---|---|
| Single BBC Plinth | £11.50 |
| Double BBC Plinth | £21.00 |
| Printer Plinth | £11.50 |
| Single Master Plinth | £16.00 |
| Double Master Plinth | £26.00 |

Disk drive Bridge for Master 128 complete with Switch mode PSU for dual drives. Mounted with 40/80 switches in the front. Will take any slimline drive and the computer neatly slides in the lower section £85.00

# BBC Software

**ACORN SOFT**

| | |
|---|---|
| Acorn View Word Processor | £44.00 |
| Acorn View Sheet | £44.00 |
| Acorn Logo ROM | £55.00 |
| Acorn ISO Pascal | £55.00 |
| Acorn BCPL | £99.00 |
| GXR ROM | £25.00 |
| View 3.0 | £69.00 |
| Hi-View | £44.00 |
| View Store | £44.00 |
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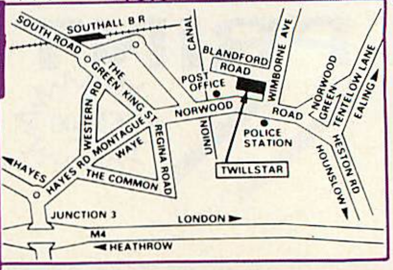


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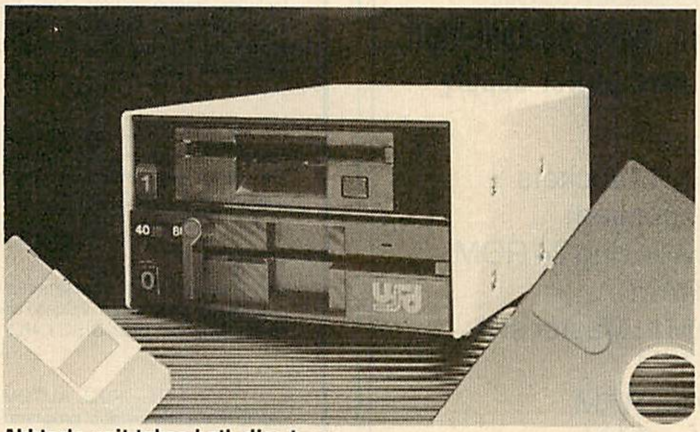
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## Both sizes in dual drive

For those with incompatability problems between the Compact and model B or M128, Akhter's Combo is a usual-sized dual unit case with both 3.5in and switchable 40/80 track 5.25in drives. It costs £259.95 with power supply or £249.95 without, from Akhter, Akhter House, Perry Road, Staple Tye, Harlow, Essex CM18 7PM.



Akhter's unit takes both disc types

# Superior puts games on 'credit cards'

*by Geoff Bains*

The first software on revolutionary 'credit cards' has been released. Cumana has put Superior Software games and Advanced Computer Products utilities onto Astron Cards.

These remarkable devices are the size and shape of credit cards but have tiny RAM or EPROM chips sealed inside them, and link to other equipment by a row of connectors.

The cards were developed in Japan as security and banking identity cards but are now found on computer games consoles. Cards with capacities of 0.5Mb are available.

Cumana has started to manufacture the cards in the UK and is producing interfaces for the BBC micro. Many games houses are interested, but Cumana sees the future of the cards with serious BBC micro users and programmers.

Cumana's first interface is a sideways ROM module, which fits a ROM socket and enables suitably programmed Astron cards to be used as sideways ROMs. It costs £24.95 and comes with Superior Software's *Star Striker* game on a card.

A sideways cartridge for the Master is also available for £44.95 with a choice of ROM software from Advanced Computer Products. Its Disc Toolkit, 1770 DFS and Disc Investigator are available in this format. All cost the same as the ROM versions.

Software to use the card system like a disc drive is to be launched with a two card system to take Astron cards with up to 512k RAM. For dedicated programmers an Astron card adapter to allow existing EPROM programmers to blow EPROM Astron cards is available for £12.95.

Software companies are eager to produce Astron card software. Superior has arranged for Cumana to produce many of its games on Astron cards, for 'the same price as disc games', as well as the excellent speech synthesiser, *Speech!* Future plans include megagames using the cards' enormous capacities and quick access.

The cards' acceptance depends on Cumana selling interfaces. Games houses are nervous of committing themselves too quickly. 'Until sufficient people use the cards we'll be sticking to cassettes and discs. However, people are buying the interfaces. The ball is in Cumana's court,' said Superior's Steve Botterill.

Despite a slow start, Cumana said, 'speed and convenience make it a very exciting prospect'. Cumana, The Pines Trading Estate, Broad Street, Guildford, Surrey, GU3 3BH.

## Concrete results

In the *Cement Management* simulation, players are expected to keep a cement company going over five years, starting with £2 million.

Production, distribution, cost analysis and investment are covered by the game.

Blue Circle has sponsored the game, which is for students aged 15 upwards. There is also a package on *Crisis Management*, based around a disposable shirt company.

Ronald Brech Research and Communications created the packs, which cost £35 and £60 respectively from System Software, 12 Collegiate Crescent, Sheffield S10 2BA.

## The latest buzz on comms

### The Comms Column

I'd like to hear from readers wanting to share each others' comms-related news and hints. Write to Buzz at *Acorn User*, 141-143 Drury Lane, London WC2B 5TF.

- Pace's long-awaited internal modem for the Master 128 includes a comprehensive comms ROM, making all of its many features easily available via single commands.

One big advantage is that the RS423 port is left free.

- *Commstar II* from Pace is compatible with the BBC models B, B+, Master 128 and Compact. It has two modes – Terminal for scrolling bulletin boards, and Viewdata for services such as Prestel.
- Gateway link-up enables Prestel users to receive messages from Telecom Gold, but entering Gateway incurs charges from both systems. Expect start-up in early 1987.
- The latest bulletin board is 'The Wizard's Shop' run by Howard Grahame and David Liff, and sponsored by Solidisk Technology, on 01-204 8755. It runs 1200/75 or 300/300 baud.
- Watford Electronics has a new modem, the Apollo, in fact another re-badged Voyager 7/Magic Modem, introduced at £75+VAT, including software.
- BeebugSoft claimed its *Command* ROM is the 'ultimate in communications for the BBC micro and Master'. The system, controlled by almost 50 star commands, has both Viewdata and Text Terminal emulators. *Command* runs the Magic Modem, and costs £39.
- Developments continue on Prestel's keyword search. Full instructions are on public view via page *1900#. One feature, 'pagemarking' lets users nominate their own keywords for quick reference using a *FETCH command. *Buzz*

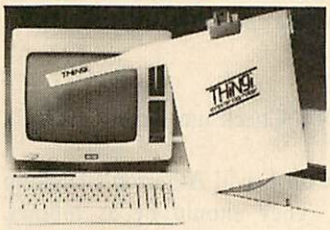
# News in brief

● Mike Barwise of Bear Hardware apologises to all Atom enthusiasts who have had late replies or no replies to letters since April.

Mike has had little time to spare due to a family bereavement. He hopes to resume normal service as soon as possible, but if you are really desperate, include a phone number when you write.

● Mask Systems claim protection for discs for all Acorn micros against copying and investigation of the catalogue and !BOOT files for £1.50 a time. Details from Mask Systems, 20 Newland Park, Hull, North Humberside, HU3 3AF.

● THiNGi has won the 'Business Idea of the Year' Award.



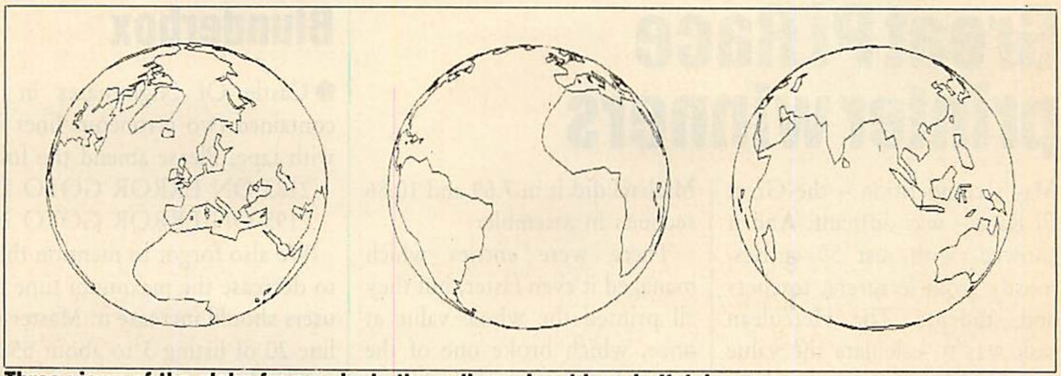
**THiNGi: British innovation**

THiNGi is a copy holder which fits on top of any monitor. It costs about £8 from Overbase, 176A Conway Street, Birkenhead, Wirral L41 3JB.

● Incentive claimed its *Adventure Creator* program has sold 1 million. It is now available for the Electron for £14.95. Incentive Software, 54 London Street, Reading, RG1 4SQ.

● Micro Studio has a range of nine graphics library discs each with 30 images for inclusion in AMX *Pagemaker*. Each costs £2.50 or £2 if five or more are ordered. Micro Studio, 83 Clay Street, Soham, Cambs.

● Technomatic has released an add-on for its Epromer II EPROM programmer, to blow 8271, 87412 and 8749 single chip microcontrollers. The MPromer costs £46.35, from Technomatic, 17 Burnley Road, London NW10 1ED.



**Three views of the globe from a single three dimensional icon in Halcien**

# Language specialist in plotting and text

Halcien is a new programming language written for the BBC micro. The name comes from High-level ALgorithmic Computer Instruction ENcoding language and author Davir Norman of High-Level Algorithms claimed it combines the best features of Basic, Pascal and Forth.

A general purpose language with a heavy bias towards graphics and text handling. It contains 50 keywords to manipulate text files in a similar way to the programming language of *Wordwise+*. It also has extensive graphics commands to handle 2–d and 3–d representations of objects. Norman said 'a wireframe box can be produced with just two commands and parameters to specify viewing angle and box size'. Halcien graphics programs will typically run at eight times the speed of a Basic equivalent, Norman claimed.

Halcien is a compiled language and produces compact programs in an intermediate code (H – Code). However, Norman said the compilation of programs is 'very fast' and using the language is 'as easy as using Basic'. Like Pascal, Halcien has many structured elements but has a 'clearer, less cluttered look'. It is also a word-based language like Forth and Logo.

Norman started writing the language in 1979 when working with Forth at the Greenwich Observatory. He intends to produce versions of Halcien for other micros, such as the IBM PC, but thought the Beeb was 'the obvious one to start with'. Halcien is supplied on 16k ROM chip with a 250 page manual and a disc of demo graphics programs and a simple

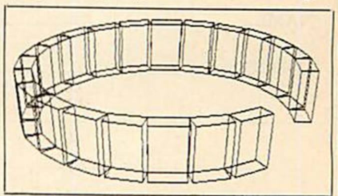


**Image programmed in 15 lines**

word processor written in Halcien. Halcien costs £49.95 from High-Level Algorithms Ltd., 12 Den Brook Close, Lydwell Park, Wellswood, Torquay, Devon, TQ1 3TP.

# Mega ROM programs easily replaced

Vine Micros has come up with an add-on board to give more ROM sockets on the Master 128. The Overlay board fits into the socket for the Master's 1Mbit (128k) ROM which then plugs into the board.

Up to three of the Mega ROM's eight ROM programs can be disabled and replaced by 'normal' 16k ROMs plugged into the Overlay board.

In this way the *Wordwise* wordprocessor ROM chip could be installed in the Master, and the *View* ROM disabled, without using any sideways RAM banks or ROM sockets.

Each extra socket on the board has a flying lead able to connect to one of eight pins corresponding to the eight ROMs in the Mega ROM. Connecting a lead to a pin disables the corresponding bank of the Mega ROM and switches in the added ROM chip software.

The overlay board costs £19.95 but it is only practical for Masters with a socketed Mega ROM. Masters with ROMs soldered in place cannot be fitted with the board.

Further details from Vine Micros, Marshborough, Sandwich, Kent.

# Great Pi Race printer winners

May's competition – the Great Pi Race – was difficult. And it showed, with just 50 entries, mostly from lecturers, teachers and students. The Herculean task was to calculate the value of pi to 500 places in the shortest time.

To cut the suspense, the three winners of a Kaga Taxan KPB810 printer were: Dr Robin Murphy of york who did it in 183 seconds in Basic; and Mattew Richards of Somerset and Michael Jenkins of Sevenoaks. Matthew and Michael did it in 7.69 and 10.86 seconds in assembler.

There were entries which managed it even faster, but they all printed the whole value at once, which broke one of the rules. J Cumpstey of Altrincham at 7.55 seconds was one.

All the entries were of a high quality and all used the Gregory Machin forumula:

pi = 16arctan (1/5) – 4arctan (1/239)

Dr J Webb's was the best tie breaker, and will form the basis of February's competition.

## Work for Acorn User

*Acorn User* is looking to take on a Network Manager. If you want to work on one of Britain's leading computer magazines in London's Covent Garden, read on ...

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## Blunderbox

- Castle Of Nightmares in the December issue (page 117) contained two erroneous lines in the changes to listing 2 for use with tape. Please amend the following lines:

```
2183 ON ERROR GOTO 2195
2195 ON ERROR GOTO 2000
```

We also forgot to mention that it was advisable for Master users to decrease the maximum time to complete a screen, and Electron users should increase it. Master users should set the variable G% in line 20 of listing 3 to about 5500 and Electron owners to 10,000.

We also forgot to mention that the three programs should be saved as NIGHTM1, NIGHTM2 AND NIGHTM3.

In the article, someone edited out the line in which it was said that the tune could be switched on/off by pressing T/O in pause mode.

- Super Plot in the November issue (page 91) – as promised the Gull listing can be found on the yellow pages. It creates a data file to load into *Super Plot*. Also, tape users should add:

```
85 CLS
```

as well as entering lines 2490, 2520, 2750 and 2880 as VDUs instead of REM statements.

- In Dave Lawrence's windows listing 1 (December), Electron users without sideways RAM should make some changes in addition to the ones mentioned. A line should be added:

```
295 latch=&AFF:RAMcopy=&7B
```

and line 3100 should read:

```
3100 IF total%<>64503 PRINT"Checksum error!":VDU7:
END
```

- The ends of a few lines were cut off David Atherton's Desktop listing on page 128 (December). They should be as follows. Thanks to Ian Smith of Wetherby for pointing it out.

```
2740 IF t$="" THEN ENDPROC ELSE PROCerr
("No comma in "+t$)
2750 MN$(x,y)=FNstrip(LEFT$(t$,comma-1)
)
2760 file$(x,y)=FNstrip(MID$(t$,comma+1
))
2810 IF ASC A$=32 THEN A$=MID$(A$,2):GO
TO 2810
2820 IF RIGHT$(A$,1)=" " THEN A$=LEFT$(
A$,LEN A$-1):GOTO2820
```

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| V251 | Viglen Master System 2<br>This system includes:<br>BBC Master 128K in Console unit<br>Dual 800K (1520K double density)<br>40/80 disc drive<br>Philips CM8501 Standard Res colour Monitor | £879.00 |

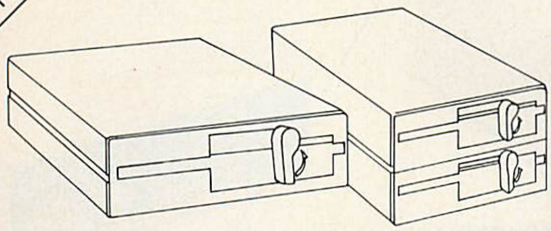
Other systems can be tailor made for your requirements, 3½" drive can be supplied instead of 5¼" at the same price. Please call.
To complete the system you only need to add a printer from any of the range. The current special offer printer that's particularly suited to the packages is the Centronics GLP at £119.95 inc. VAT.
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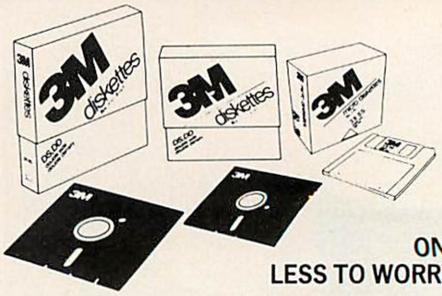


All disc drives are supplied with a manual, packed utilities disc and a full 12 Months warranty (2 Year Warranty available) and are ready to plug in and use on a BBC B (fitted with a DFS) B + or Master micro.
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The capacities quoted are given in single density mode; for double density mode (1770 DFS + ADFS as in the Master) the capacities should be approximately doubled.
An integral power supply is not necessary as the disc drives run from the micro's power source however should you require drives with their own power supply please add the price of the integral power supply to the price of the drive.
If your BBC B micro does not have a DFS fitted then you will also require the Acorn dfs kit.

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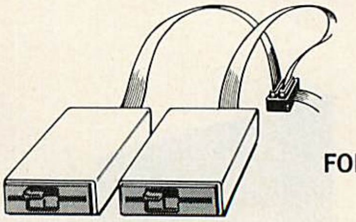

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Please add £2.00 P & P.

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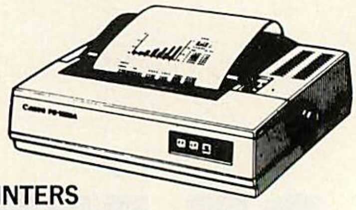
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* No soldering simply plugs in.
* No need to take disc drives apart to change links.

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## PRINTERS



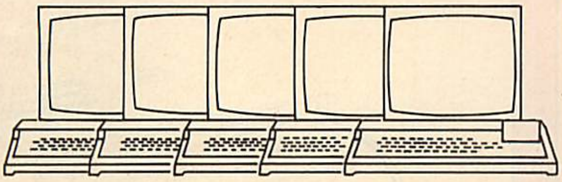
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| V420 | Epson LX86 with tractor feed | £269.00 |
| V421 | Epson FX85 | £379.00 |
| V422 | Epson LQ800 (200 cps) | £559.00 |
| **Daisywheel Letter quality printers** | | |
| V400 | Juki 6100 | £279.00 |
| **Ribbons** | | |
| V462 | Canon PW1080A/Taxan KP810 ribbon | £5.95 |
| V463 | Epson MX80/RX80/FX80/FX85 ribbon | £6.00 |
| V464 | Centronics GLP ribbon | £3.95 |
| **Printer cables** | | |
| V495 | BBC micro/ Master printer cable | £8.00 |
| V497 | Master Compact printer cable | £8.00 |

Please add £8.00 for insured courier delivery and £1.50 for ribbon.

# THE VIGLEN RANGE

## MICROS



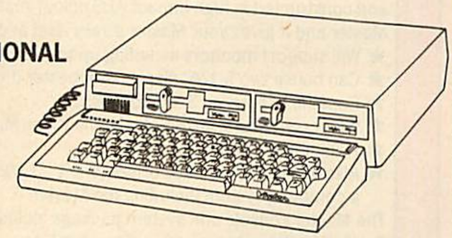
### BBC MICROS

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| V210 | BBC Master 128K | £459.00 |
| V204 | BBC Master COMPACT entry system | £442.75 |
| V205 | BBC Master COMPACT TV system | £458.00 |
| V206 | BBC Master COMPACT Monochrome system | £539.35 |
| V207 | BBC Master COMPACT Med Res Colour sys | £688.85 |
| V208 | BBC Master COMPACT Std Res Colour sys | £621.75 |

Please add £8.00 for insured courier delivery.

## BBC CONSOLE UNIT

### VIGLEN PROFFESSIONAL CONSOLE UNIT

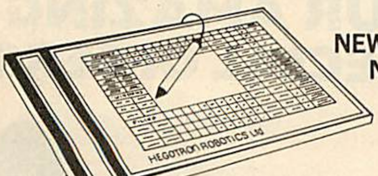


Your BBC micro can be given the professional PC-look by replacing your existing lid with this smartly styled package which can house two disc drives, the Viglen Rom cartridge system, most internal boards and can support monitors including 14" television sets.
PCU Package includes: Keyboard case, Metal screened main unit, casing including internal fittings, 2 meter coiled cable to connect main unit to keyboard, Blanking plates to blank out disc drive apertures, Keyboard label.
Other accessories are also available including units fitted with single or dual drives.

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| V851 | Viglen Professional Console unit for the BBC micro (PCU) | £49.00 |
| Accessories for the Professional Console unit | | |
| V852 | 2 Meter coil cable on its own | £15.00 |
| V853 | Dual drive data cable for console unit | £9.00 |
| V853 | Dual drive power cable for console unit | £5.00 |
| V855 | Power supply for PCU (capable of running two 1/2 height drives) | £32.00 |
| V856 | Fan kit for PCU (only necessary if your BBC normally gets extremely hot) | £29.00 |
| V857 | Extension keyboard on its own including coiled cable. | £29.00 |
| V858 | Fitting bracket for 3½" drive | £9.00 |
| | Fitting service available from | £15.00 |

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## GRAPHICS



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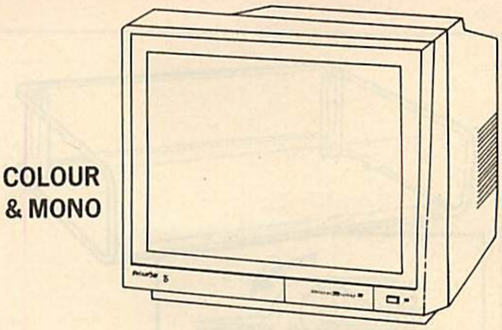
### GRAFPAD 2

The Grafpad 2 is the ultimate in graphic input devices and includes a new powerful art package allowing you to draw and paint in numerous colour and pattern combinations. Other facilities include copying, inverting, mirror imaging and flipping any part of your picture. The software comes on Rom and disc.
It's fast, easy to use and all commands are selected directly from the tablet, even text and numerics. Just point the pen and click the switch.
Resolution: 1280 × 1024 pixels.

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| V568 | Graphpad 2 | £75.50 |

Please add £8.00 insured courier delivery.

## MONITORS



### COLOUR & MONO

All the following monitors are supplied with a cable to fit the BBC micro/ Master and Compact.

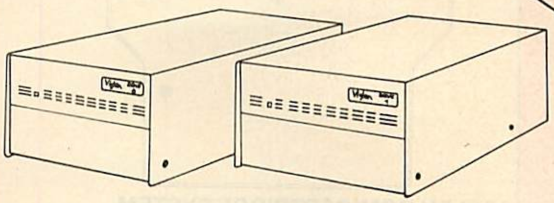
| Stock Code | Description | Price inc. VAT |
|---|---|---|
| **Monochrome Monitors** | | |
| V331 | Philips BM7502 Hi Res Green | £85.00 |
| V332 | Philips BM7522 Hi Res Amber | £95.00 |
| V333 | Taxan KX1201 Hi Res Green | £89.00 |
| **Colour Monitors** | | |
| V345 | Philips CM8501 Std Res Colour Monitor | £149.00 |
| V346 | Philips CM8533 Med Res Colour Monitor | £289.00 |
| V300 | Microvitec 1431 Std Res Colour Monitor | £209.00 |
| V301 | Microvitec 1451 Med Res Colour Monitor | £259.00 |
| V304 | Microvitec 1451APL Med Res Colour Monitor with PAL | £299.00 |
| V302 | Microvitec 1441 Hi Res Colour Monitor | £425.00 |
| V356 | Taxan Super Vision II | £299.00 |
| V357 | Taxan Super Vision III | £369.00 |

Please add £8.00 for insured courier delivery.

## WINCHESTERS

### MEGA BYTES FOR MINI BUCKS

NEW LOW PRICES



Plug in 20 to 112 Megabytes of extra storage with the Viglen Winchester system.
The Viglen Winchester is ready to plug in and use on a BBC Master micro; for a BBC B or B plus you will merely need to fit the Acorn ADFS Rom. The Winchesters are 100% compatible with the Acorn Winchester and Acorn ADFS and will also work with the Acorn Master 512 board with DOS plus.
Drive 1 Winchesters are also available for backup or just more storage and simply plug into the back of the Drive 0 unit.
The Winchester package consists of: Winchester unit (cased with controller boards, power supply and fan), Master reference Manual part 1, Winchester user guide and Winchester utilities on disc (such as formatter, verifier, ADFS menu and sophisticated backup program allowing you to make fast backups on DFS discs, ADFS discs or Drive 1 Winchester.)

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| **Drive 0 Single** | | |
| V150 | VB20 20Meg Viglen Winchester | £699.00 |
| V152 | VB28 28Meg Viglen Winchester | £759.00 |
| V155 | VB40 40Meg Viglen Winchester | £1045.95 |
| V156 | VB56 56Meg Viglen Winchester | £1119.95 |
| **Drive 1 Second Drive** | | |
| V160 | VB120 20Meg Drive 1 Winchester | £599.00 |
| V162 | VB128 28Meg Drive 1 Winchester | £649.00 |
| V165 | VB140 40Meg Drive 1 Winchester | £819.95 |
| V167 | VB156 56Meg Drive 1 Winchester | £899.95 |
| V503 | Acorn ADFS Rom and Manual (Only necessary for BBC B or B Plus | £29.95 |

Please add £8 for insured courier delivery.

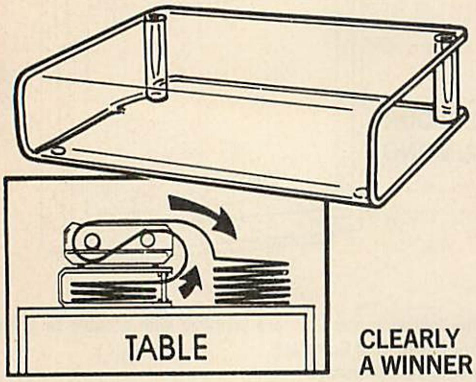
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Viglen

# THE VIGLEN RANGE

## PRINTER STANDS



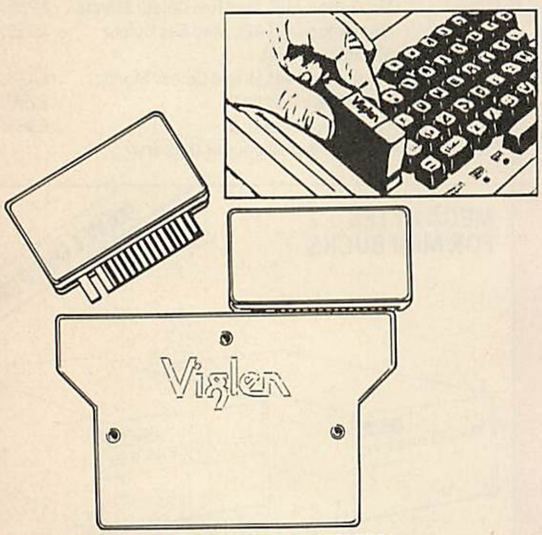

CLEARLY
A WINNER

The Viglen printer stands are beautifully finished in clear perspex and raise the printer high enough to put continuous stationary underneath.

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| V490 | 80 Column Printer Stand (15″ × 13″ × 3.5″) | £19.95 |
| V491 | 136 Column Printer Stand (23.5″ × 13″ × 3.5″) | £27.95 |

Please add £3 P & P

## CARTRIDGE SYSTEM



### VIGLEN ROM CARTRIDGE SYSTEM

Having fitted the Viglen Rom cartridge system to your BBC, Master or Master COMPACT, you can plug in your Roms/Eproms simply by inserting each one in a Viglen cartridge and plugging in whichever cartridge you want to use. The same Viglen cartridge can be used on all the micros mentioned and there is no need to switch the micro on and off between cartridge changes.

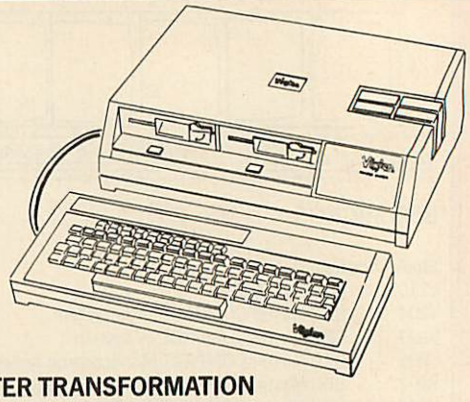
The Viglen cartridge system for the BBC micro consists of the cartridge cable assembly and socket, blanking off plates, 1 cartridge and cartridge storage rack. The cartridge socket when fitted protrudes from the rectangular slot on the left of the keyboard where the cartridges are subsequently inserted. It is simple to fit and requires no soldering.

The Viglen cartridge system for the Master and Master COMPACT simply plugs into your Master cartridge slot (or COMPACT expansion port) and accepts two Viglen cartridges. On the Master you can plug in up to two Viglen cartridge systems thus giving you access to 4 Viglen Cartridges simultaneously. The system comes complete with 2 cartridges and cartridge storage rack. On the Master you can also use Viglen cartridges which have 32 and 64K paged Roms inserted.

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| V560 | Viglen Rom cartridge system for BBC | £12.95 |
| V559 | Viglen Rom cartridge system for BBC (low profile) | £12.95 |
| V550 | Viglen Rom cartridge system for Master | £14.95 |
| V551 | Viglen Rom cartridge system for COMPACT | £14.95 |
| V561 | Single Viglen cartridge | £1.99 |

Please add £2.50 P & P (£00.50 for single cartridge).

## CONSOLE SYSTEM



### MASTER TRANSFORMATION

Give your BBC Master micro the professional PC look by replacing your existing lid with this smartly styled package. The system is strong and constructed in high impact ABS colour matched to the BBC Master and it gives your Master a very neat and impressive look.

- ★ Will support monitors including up to 16″ TV.
- ★ Can house two 5 1/4″ disc or Winchester drives.
- ★ Capable of housing 3 1/2″ drives.
- ★ Will accept Acorn cartridges and the Viglen Master Cartridge system.
- ★ Full internal metal screening.
- ★ Also available with fitted drives (5 1/4″, 3 1/2″ or Winchester) or as a complete system including the Master.

The Master console unit system package includes:
Remote keyboard case with 1.2m cable.
Metal screened main unit casing
including internal fittings for 5 1/4″ drives.
Two switches which can be used for 40/80 track switching and can be either fitted on the front or rear of unit.
Two blanking plates to blank out any drive aperture that is not used.
Full labelling kit.
Fully illustrated fitting instructions.

| Stock Code | Description | Price inc. VAT |
|---|---|---|
| V861 | Viglen Master Console unit | £59.00 |
| Accessories for the Master Console unit | | |
| V853 | Dual Drive data cable for console unit | £9.00 |
| V854 | Dual Drive power cable for console unit | £5.00 |
| V855 | Power supply for the console unit | £32.00 |
| V856 | Fan Kit for console unit | £29.00 |
| V858 | Fitting bracket for 3 1/2″ drive | £9.00 |
| | Fitting service available from | £15.00 |

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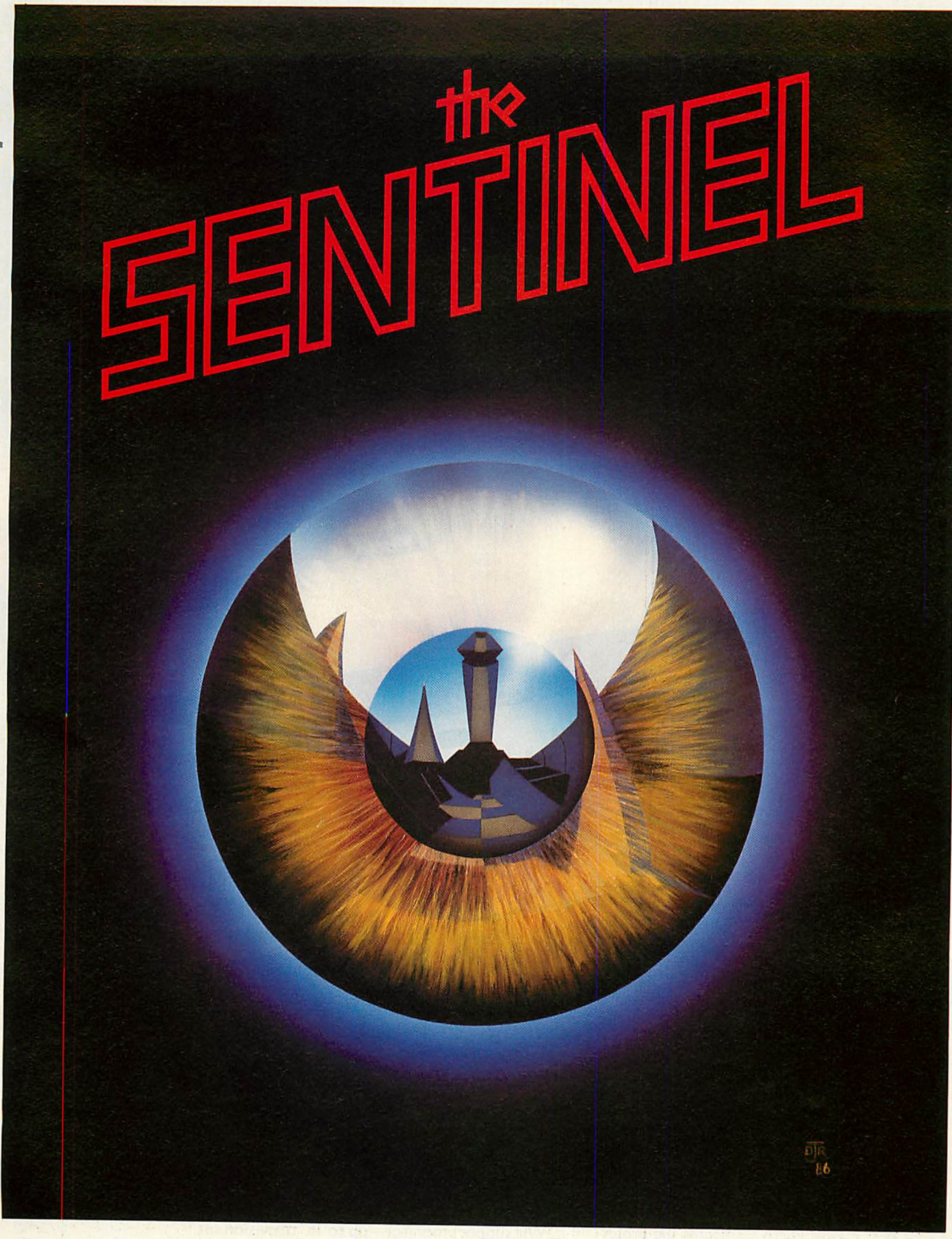
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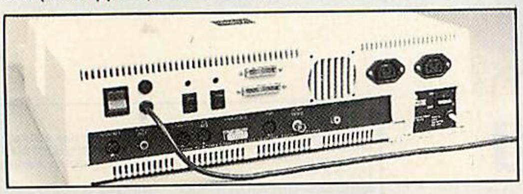
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*No stamp required.

# MASTER TRANSFORMATION
## The Viglen Master Console




Give your BBC Master Micro Computer the professional PC look by replacing your existing lid with this smartly styled package. The system is strong and constructed in high impact ABS colour-matched to the BBC Master, it gives your Master a very neat and impressive look.

The photograph shows a fully kitted out back panel with the host of accessories, such as switches, sockets, connectors, etc. (not supplied) but are available.



- ☐ Will support monitor – up to 16″ television set.
- ☐ Can house two 5¼″ disks or Winchester drives.
- ☐ Capable of housing 3½″ drives.
- ☐ Includes two switches (can be used for 40/80 track switching) which can be fitted in the front or the rear. The above photograph shows two front fittings.
- ☐ Will take two Acorn cartridges or two Viglen cartridge system: *each system* is capable of accepting two Viglen cartridges, thus allowing a total of four Viglen cartridges to be used.
- ☐ Keyboard is separate for ease of use.
- ☐ Full internal metal screening.
- ☐ Supplied with easy, do-it-yourself, fully illustrated instructions or can be fitted by Viglen.
- ☐ Available with fitted drives (5¼″, 3½″ or Winchester) or as a complete system including the master and monitor.

# Viglen

## PACKAGE INCLUDES:

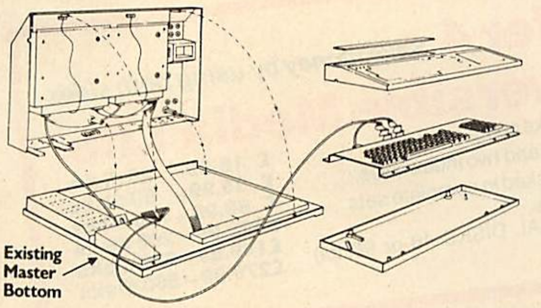
1. Remote keyboard case with 1.2m cable.
2. Metal screened main unit casing including internal fittings 5¼" drives.
3. Two switches which can be used for 40/80 track switching and be fitted either to the front or back of the unit.
4. Two blanking plates to blank out any drive apertures that are not used.
5. Full labelling kit.
6. Fully illustrated fitting instructions.

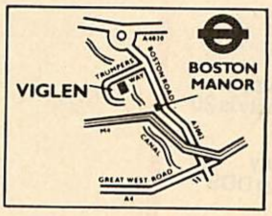
## ONLY £59.00 inc VAT

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### ACCESSORIES

| DESCRIPTION | PRICE INC VAT |
|---|---|
| (a) Dual drive data cable | £9.00 |
| (b) Dual drive power cable | £5.00 |
| (c) Internal switched mode power supply | £32.00 |
| (d) Fan kit | £25.00 |
| (e) Viglen Master Cartridge System including two Viglen Cartridges | £14.95 |
| (f) Viglen cartridge | £1.99 |
| (g) Fitting (for 3½" drive) | £9.00 |
| (h) Fitting charges start from | £15.00 |




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Viglen Computer Supplies: Unit 7, Trumpers Way, Hanwell, London W7 2AQ, Sales Hotline 01-843 9903.
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Please send me ______ (Qty) Master Console System(s) Plus Optional Extra(s) ______ State ref. letter
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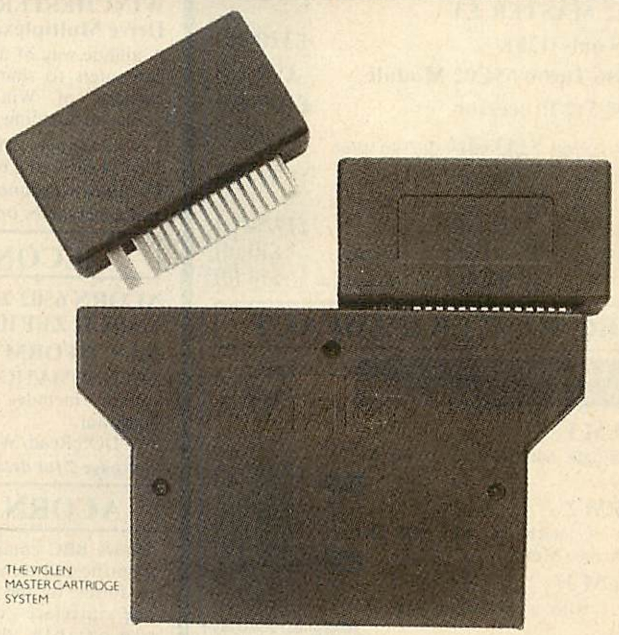
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# TWO INTO ONE WILL GO!



THE VIGLEN MASTER CARTRIDGE SYSTEM

The Viglen Master Cartridge System plugs into the Master cartridge slot enabling it to accept two Viglen Cartridges (the same cartridges that are used for the BBC micro fitted with the Viglen ROM Cartridge System). Once the system is plugged in you can insert and remove Viglen cartridges fitted with any ROM or Eprom programs available for the Master. Up to two systems can be fitted allowing a total of 4 Viglen Cartridges to be used.

- Simply plugs into the Master cartridge slot
- Each system accepts two Viglen cartridges giving access to a total of 4 Viglen Cartridges
- Will accept the Viglen Cartridges as used on the BBC micro
- Each Viglen Cartridge will take 8K, 16K, 32K (Paged type), 64K (Paged type), ROMs or EPROMs. Simply unscrew the cartridge case, insert the ROM/EPROM and screw the case back on
- Low price cartridges
- Adaptor includes two FREE cartridges

| | Price inc. VAT |
|---|---|
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______ Expiry Date ______

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305 Edgware Road, London W2
Tel: 01-723 0233
(near Edgware Road ⊖)

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Please add carriage
(a) £8.00 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

## DISC DRIVES

Full details on page 6.

*All drives fitted with MITSUBISHI mechanisms.*

**5.25" Single Drives 40/80 switchable:**

| | |
|---|---|
| **TS400** 400K/640K | £114 (b) |
| **PS400** 400K/640K with integral mains power supply | £129 (b) |

**5.25" Dual Drives 40/80 switchable:**

| | |
|---|---|
| **TD800** 800K/128OK | £226 (a) |
| **PD800** 800K/1280K with integral mains power supply | £229 (a) |
| **PD800P** 800K/1280K with integral mainspower supply and monitor stand | £249 (a) |

**3.5" 80T DS Drives:**

| | |
|---|---|
| **TS351** single 400K/640K | £99 (b) |
| **PS351** single 400K/640K with integral mains power supply | £119 (b) |
| **TD352** Dual 800K/1280K | £170 (b) |
| **PD352** Dual 800K/1280K with integral mains power supply | £187 (b) |

## DISC DRIVE MULTIPLEXER

*Full specification on page 6.*

| | |
|---|---|
| **TDM2** Dual Unit: 2 computers/one drive unit | £75 (b) |
| **TDM4** Quad Unit: 4 computers/one drive unit | £135 (b) |

## 3M FLOPPY DISCS

**5.25" Discs in packs of 10**

| | |
|---|---|
| **744** 40T SS DD | £10.00 (d) |
| **745** 40T DS DD | £12.00 (d) |
| **746** 80T SS DD | £14.50 (d) |
| **747** 80T DS DD | £16.00 (d) |

FREE Clock calculator with every 5 boxes of 3M discs purchased.

(Add £1 for library case packing)

**3.5" Discs in packs of 10**

| | |
|---|---|
| **80T** SS DD | £20 (d) |
| **80T** DS DD | £25 (d) |

## BULK DISCS

High quality unlabelled discs supplied in packs of 50 in a storage box. The 5.25" discs have the reinforcing hub rings. These discs are guaranteed for life.

| | |
|---|---|
| 50 5.25" 40 T single sided discs in lockable box. | £35 (b) |
| 50 5.25" 80T double sided discs in lockable box. | £45 (b) |
| 50 3.5" 80T double sided discs in lockable box. | £95 (b) |

**FLOPPICLENE DRIVE HEAD CLEANING KIT**

| | |
|---|---|
| **5.25" Kit** with 20 disposable discs | £12.50 (d) |
| **3.5" Kit** with 20 disposable discs | £14.00 (d) |

**DISC STORAGE BOXES**

| | |
|---|---|
| **DB530** Non Lockable 30 x 5.25" | £6.00 (c) |
| **DB340** Lockable 40 x 3.5" | £8.50 (c) |
| **DB550** Lockable 50 x 5.25" | £9.00 (c) |
| **DB570** Lockable 70 x 5.25" | £11.00 (c) |
| **DB5100** Lockable 100 x 5.25" | £13.00 (c) |

## MONITORS

*BBC lead incl with all monitors*

**MICROVITEC 14" RGB Monitors**
Please specify plastic or metal case.

| | |
|---|---|
| **Microvitec 1431** Standard Resolution 453 pixels | £179 (a) |
| **Microvitec 1431AP** As 1431 + composite video and sound input | £199 (a) |
| **Microvitec 1451** Medium Resolution 653 pixels | £225 (a) |
| **Microvitec 1451AP** As 1451 + composite video and sound input | £259 (a) |
| **Microvitec 1441** High Resolution 895 pixels | £365 (a) |

**Microvitec 20" RGB/PAL/ Audio Monitors**

| | |
|---|---|
| **Microvitec 2030CS** Standard Resolution RGB/Comp Video | £380 (a) |
| **Microvitec 2040CS** High Resolution RGB/Comp Video | £685 (a) |
| **TOUCHTEC-501** Brings genuine touch screen operation on metal cased Microvitec monitors, incl utilities disc with starter and development programs | £219 (b) |
| **PHILIPS 8501** RGB Standard Resolution | £139 (a) |
| **TAXAN SUPER VISION II** 12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible | £279 (a) |
| **TAXAN SUPER VISION III** 12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. | £319 (a) |
| **MITSUBISHI XC1404** 14" Med Res RGB Monitor Etched dark screen brilliance and contrast control, BBC/IBM compatible | £219 (a) |

**12" MONOCHROME MONITORS**

| | |
|---|---|
| **TAXAN KX1201G** Hi Res green etched screen | £90 (a) |
| **TAXAN KX1202G** Hi Res Long Persistence (P39) | £95 (a) |
| **TAXAN KX1203A** Hi Res amber etched screen | £95 (a) |
| **PHILIPS BM 7502** Hi Res green screen | £75 (a) |
| **PHILIPS BM7522** Hi Res amber screen | £79 (a) |

**MONITOR ACCESSORIES**

| | |
|---|---|
| Microvitec Swivel Base (14" plastic monitors) | £20 (c) |
| Philips Swivel Base | £14 (c) |
| Monitor Stand Models B & B+ | £10 (c) |
| Monitor Stand Master | £13 (c) |
| Double Tier stand Models B, B+ or Master | £24 (b) |
| Taxan RGB Lead | £5 (d) |
| Microvitec Lead | £3.50 (d) |
| Monochrome BNC/Phono Lead | £3.50 (d) |

## RAM/ROM EXPANSION

| | |
|---|---|
| **ATPL Board** for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2 8K Rams | £37 (c) |
| ATPL Battery backup kit | £16 (d) |
| ATPL Board for BBC+ (now in stock). | £31 (c) |
| **RAMROM 15** for Model B. External board in an attractive case — easy access to sockets. 6502 Processor signals for development work. | £69 (b) |
| **TIME WARP** Real Time Clock. Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program | £31 (d) |

## MODEMS

(All modems are BABT approved)
*See page 7 for modem specifications*

| | |
|---|---|
| **MIRACLE WS2000V21/23** & BELL stds | £102 (c) |
| WS2000 Auto Dial Card | £27 (d) |
| WS2000 Auto Answer Card | £27 (d) |
| WS2000 SK1 Kit | £5 (d) |
| WS2000 DS1 disc | £10 (d) |
| WS2000 Data Cable for BBC | £6 (d) |
| **MIRACLE WS4000 V21/23** | £149 (b) |
| **MIRACLE WS3000 V21/23** | £295 (b) |
| **MIRACLE WS3000 V22** | £495 (b) |
| **MIRACLE WS3000 V22 bis** | £650 (b) |
| **WS3022 1200/1200 fd** | £395 (b) |
| **WS3024 2400/2400 fd** | £570 (b) |
| BBC Data Cable for WS3000/4000 | £7 (d) |
| **GEC DATACHAT Modem V23** 1200/75, 75/1200 & 1200/1200 pseudo f.d. line powered, complete with software suitable for connecting to Prestel, Micronet, Telecom Gold and many bbs. **Special offer price** | £39 (b) |

## PROGRAMMING ACCESSORIES/SOFTWARE

*See page 8 for detailed specification*

Compatible with B, B+ and Master

| | |
|---|---|
| **EPROMER II** with disc based software and rom image | £99 (b) |
| **MPROMER** | £49 (c) |
| **META ASSEMBLER** | £145 (b) |
| **PORTAL EPROM EMULATOR 128K** | £185 (b) |
| **PORTAL EPROM EMULATOR 512K** | £285 (b) |
| **TEAM Disassembler** | £145 (b) |

**EPROM ERASERS**

| | |
|---|---|
| **UV1B** 6 eproms, safety cutout | £47 (b) |
| **UV1T** 6 eproms, timer, safety cutout | £59 (b) |

## EPROMS/RAMS

| | |
|---|---|
| 2764-25 | £2 (d) |
| 27128-25 | £2.50 (d) |
| 6264LP-15 | £3.40 (d) |

Look for the holly symbols and then see page 5 for our special XMAS offers.

# TECHNOMATIC

**17 Burnley Road, London NW10 1ED Tel: 01-208 1177**
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## CAD/DRAWING PACKAGES

**NOVACAD CAD** Package for B, B+ & MASTER (See page 9 for specification)

**BASIC Version** £59 (d)
**Tracker Ball/Mouse Version (TM)** £71 (d)
**TM Version plus Tracker Ball** £105 (c)
**TM Version plus Mouse** £90 (c)
**Plotter Driver Generator** £21 (d)

**MOUSE**

**AMX MOUSE with SUPER ART** £63 (d)
(pse specify B, B+ or Master)
**Super Art** £43 (d)
**PAGEMAKER** £39 (d)
**3D ZICON** £21 (d)
**PAINTPOT** £21 (d)
**DATABASE** £21 (d)

**RB2 TRACKER BALL**

RB2 Tracker Ball with Icon Master (for B, B+ & Master) £52 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only) £52 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software) £47 (c)
Cursor Control Rom for Master £12.50 (d)
**MIRRORSOFT FLEET STREET EDITOR** incl VAT £39.50 (d)

## CP/M SOFTWARE

*for Acorn, Torch & Multiform Z80 Processors*

**MICROPRO's** Wordstar Professional £310 (a)
**ASHTON TATE's** DBASE II £310 (a)
**SUPERCALC II** £195 (a)

*Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.*

## BBC SOFT/FIRMWARE

### DATABASE MANAGEMENT SYSTEMS

**VIEWSTORE**
Acorn's database with display in any mode in spreadsheet or user defined card format and powerful sort facilities. Max file size 4Mb £37 (d)

**STARdataBASE**
A fast machine code, true random access database. Upto 4000 records/file, 69 fields. Fully menu driven, user defined record layout, very fast searches thru keysearch facility. Mailmerging from VIEW and WW. £49 (d)

**MASTERFILE II**
Highly popular economically priced database. 17 fields per record, file size limited by drive capacity only. (40T or 80T) £17 (d)

### WORD PROCESSORS

**VIEW 2.1** £37 (d)

**VIEW 3.0**
New version of VIEW compatible with B+ complete with a printer driver generator. £56 (c)

**Hi-VIEW**
Disc based version of VIEW 2.1 for use with 6502 2nd processor allowing upto 47K of memory for text. £36 (d)

**VIEWSPELL**
Acorn's new rom based spelling checking utility with a 70,000 word dictionary on 80T disc. Additional/specialised dictionaries can be created. Facilities also include wild card search for words. £29 (d)

**VIEW INDEX** £12 (d)

**VIEW PRINTER DRIVER GENERATOR**
A utility to generate a View printer driver to suit any printer. Screen driver allows viewing of text exactly as it will appear on paper. £9 (d)

**DOT PRINT PLUS**
Full details on page 5 NLQ rom for Epson FX/RX, MX and GLP. £28 (d)

**WORDWISE** £24 (d)
**WORDWISE PLUS** £38 (d)

**INTERWORD**
(If you own a WW+ then quote your reg number and pay £39). £46 (d)

**WORDEASE**
A 16K rom based utility for WW+ £24 (d)

**SPELLCHECK III**
A 16K rom based spellcheck program for View and WW. Contains 2000 words on the rom and 6000 (expandable to 17000) words on a disc. £31 (d)

**EDWORD II** £43 (c)

### SPREADSHEETS

**VIEWSHEET**
Acorn's spreadsheet provides 255 cols and 255 rows and will operate in any mode. Fully compatible with VIEW and 6502 2nd processor. £37 (d)

**VIEWPLOT**
A disc based plotting program. (To be released soon). £22 (d)

**INTERSHEET**
The new spreadsheet from Computer Concepts with many advanced features like 105 col mode, holding several spreadsheets in memory at a time etc. £39 (d)

**INTERCHART**
Graphics package for Intersheet £27 (d)

**ULTRACALC**
BBC Publications very popular and well proven spreadsheet rom includes graphics utility disc. £52 (d)

**QUICKCALC**
A disc based economically priced spreadsheet package (40 or 80T Disc). £14.50(d)

**MINI OFFICE II (for BBC B)**
A suite of inexpensive but extensive word processor, database and spreadsheet packages. (40T or 80T) £14.75(d)

### LANGUAGES

**META ASSEMBLER**
Multi processor Assembler full details on page 8 £145 (c)

**TEAM DISASSEMBLER** £145 (b)

**ACORN 6502 DEV. PACKAGE**
A macro assembler with utilities for developing large programs in assy lang. Requires 6502 2nd processor. £43 (d)

**MACROM**
A very fast full featured macro assembler rom from 6502 and 65C02 codes, allows use of macros from library disc. Assembly can be disc to memory, memory to memory, memory to disc and disc to disc thus allowing very long source code upto the length of disc in use. About 3 times as fast as ADE and 30% more economical in memory. £33 (d)

**ACORN MICRO PROLOG**
Logic programming language used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more friendly. £62 (d)

**ISO-PASCAL**
Acorn's full implementation of International Std Pascal on 2x16K roms. £48 (c)

**ISO PASCAL STAND ALONE GENERATOR** £30 (d)

**OXFORD PASCAL**
A fast P-code compiler and stand alone utility (40 or 80T). £36 (d)

**BCPL** £46 (c)

**BCPL CALCULATIONS**
Supports floating point, fixed point and fast integer calculations on BCPL £17.50 (d)

**BCPL STAND ALONE GENERATOR** £39 (d)
**ACORN LOGO** £46 (c)
**LOGOTRON LOGO** £55 (c)
**BBC PUBLICATIONS OPEN LOGO** £59 (c)
**ACORN LISP ROM** £39 (d)
**ACORN FORTH ROM** £39 (d)
**ACORN COMAL ROM** £43 (d)

**MICROTEXT**
A frame based authoring system from NPL for interactive computer tutoring. Disc based £52 (c)

**MICROTEXT PLUS**
Extended Features incl extra memory, control of external devices etc. Rom based. £229 (b)

### COMMUNICATIONS

**TERMULATOR**
Advanced terminal emulator which includes VT52/100, Tektronics 4010, teletype emulations. £25 (d)

**COMMSTAR**
A highly popular communication rom suitable for all general purpose applications (specify B or Master) £28 (d)

**COMMUNICATOR**
A full 80 col VT100 emulation program with easy to follow screen menus. £49 (d)

**DATABEEB**
A variety of facilities for use with WS2000 Modem £26 (d)

**DS1 DISC**
Special utilities for use with WS2000 £10 (d)

### UTILITIES

**ACCELERATOR** £49 (d)
**ACORN BASIC EDITOR** £22 (d)
**MONITOR** (BBC Pub) £34 (a)
**BROM PLUS** £26.50 (d
**SLEUTH** £23 (d)
**TOOLKIT PLUS** £31 (d)
**TOOLBOX 2** (BBC Pub) Manual £9.50 (d)
Cassette £9 (d)
**EXMON II** £23 (d)
**HELP II** £25 (d)
**ACORN GXR GRAPHICS ROM** specify B or B+ £22 (d)
**PRINTMASTER** £24 (d)
**DUMPMASTER** supports about 40 printers £26 (d)
**FONTWISE PLUS** £17 (d)
**HERSHEY FONT CHARACTER GENERATOR** £18 (d)
**ICON MASTER** £29 (d)
**BILLBOARD** £18 (d)
**STUDIO EIGHT** £19 (d)
**MOVIE MAKER** Two Roms+Cassette £26 (d)
**CC SPEECH ROM** £28 (d)
**CC SPEECH ROM** to Text Rom £34 (d)
**ACORN SPEECH ROM** £15 (d)
**ADV TELETEXT UTILITIES ROM** £7.95 (d)

**TECHNOLINE**
(24 hr viewdata system)
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Telex: 922800

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Please add carriage
(a) £8.00 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

## BBC PUBLICATIONS EDUCATIONAL SOFTWARE

**A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.**

### PRIMARY EDUCATION

**ASTRONOMY:**
9-12 years. Phases of moon, eclipses, seasons etc. Includes a game. Disc **£11 (d)**

**COMPUTERS AT WORK:**
The Work Game illustrates two of the most important computer applications: Robotics & IT. Incl. a database prog, word processing tutorial and a robotic control prog. Aud/EC/disc **£16 (c)**

**PICTURE CRAFT**
An inexhaustible, versatile and flexible suite of programs to design shapes & patterns, paint them and convert them into pictures, puzzles and games. Disc **£17 (d)**

**DRAWSTICK**
8 year upwards for creating pictures, charts, maps etc. Pictures created can be used in your own programs. Sufficiently sophisticated for use by adults. Cass **£8 (d)**

**INTRODUCING GEOGRAPHY**
9-13 years. Four exciting graphical adventures include river navigation, flying, mountain climbing and desert crossing. Disc **£16 (d)**

**MATHS WITH A STORY 1**
Four primary level programs incl symmetry, co-ordinates and probability for children of wide ranging abilities. Cass **£8 (d)**

**MATHS WITH A STORY 2**
Similar programs as 1 but covered from a different angle. Cass **£8 (d)**

**NUMBER GAMES:**
6 programs designed to stimulate the mind of an active child of 8 years and upward. Cass/EC **£7.50(d)**

**USING YOUR COMPUTER**
8/12 years. Introduction to computers using synchronised audio techniques. Total of 80mins of audio & 14 progs. Cass **£24 (c)**

**WORD PLAY**
An elegant but simple introduction to word processing using animal shapes for editing functions. Fun manual for the children. Cass **£10 (d)**

**WORD MOVER**
A simple text editor. Cass **£8 (d)**

### SECONDARY LEARNING

**ADVANCED LEVEL STUDIES: STATISTICS**
6 progs covering central concepts and principles. Topics include Discrete Data & Binomial Distribution. Eont. Data & Normal Data Distribution. Hypothesis Testing & Confidence intervals, Central Limit theorem & Estimation, Simulations, Correlations and Regressions. Disc **£23 (d)**

**ADVANCED STUDIES: GEOGRAPHY**
4 progs covering social geography: Traffic & Town planning, drainage & basin management and planning for industry. Cass **£10 (d)**

**INSIDE INFORMATION**
Designed to introduce IT to young adults. Suitable for use in sec. schools, ITeCs & Adult Educ. Centres. Prog Cass **£10 (d)** Audio Cass **£5 (d)** Book **£8 (d)**

**OPEN LOGO**
Open University Logo incl two 16K roms and two manuals. **£55 (c)**

**SCIENCE TOPICS (ST)**

**S.T.: WAVES**
A Physics program allows display of waveforms and shows changes caused by different parameters. Disc **£14 (d)**

**S.T.: RELATIONSHIPS**
A Biology program giving a sophisticated simulation exercise based on data from W.H.O. Disc **£14 (d)**

**S.T.: BONDING**
A Chemistry program to reinforce & strengthen the concept of bonding of elements. Transfer and sharing of electrons are both shown graphically. Disc **£14 (d)**

**S.T.: ELECTROMAGNETIC SPECTRUM**
A graphical adventure prog to test your knowledge of the electromagnetic spectrum. Disc **£14 (d)**

**S.T.: ELECTRONICS IN ACTION**
Program about using computers for control. Control is achieved by using 6502 assy lang. Prog editor is supplied. Disc **£14 (d)**

**S.T.: NEWTON & THE SHUTTLE**
A interactive prog in 3 parts covering launch to recapture of a satellite to test the knowledge of Newtonian mech. Disc **£19 (d)**

**S.T.: ECOLOGY**
Simulation program managing a nature reserve to meet a host of individual needs. Disc/EC **£19 (d)**

**S.T.: POLYMERS**
Students run a manufacturing co. and have to choose best materials for their products and compete with a rival co. run by the computer. Disc/EC **£19 (d)**

**S.T.: CLASSIFICATION & PERIODIC TABLE**
A database program for producing different classifications of chemical information and presented in any format. Disc **£20 (d)**

**S.T.: FOOD & POPULATION**
Simulation in space of biological aspects of nutrition and food production logistics. Disc **£20 (d)**

**SEC. SCIENCE: MICROTECHNOLOGY**
Fundamental concepts of electronics Logic & Resistor Tutors, Servo Cct simulation & a cct design program. Cass **£7 (d)**

**SEC. SCIENCE: THE MOLE CONCEPT**
A computer sync. audio program explains definitions of atomic & molecular masses and depicts molar equations. Disc/Aud/EC **£16 (c)**

**SEC. SC.: UNIFORMLY ACCELERATED MOTION:**
Illustrates basic eqns., uniform accln, under gravity and an idea of terminal velocity. Disc/AUD/EC **£16 (d)**

**VU-TYPE**
The popular 'Sight & Sound' touch typing tutor with alterable settings. Disc/EC **£15 (d)**

### GENERAL

**GAME CORE**
Provides information and intelligence routines for writing board games. Cass **£9 (d)**

**VU TYPE PROFESSIONAL**
An enhanced and expanded version of Vu Type with 63 Pitman approved exercise. Disc **£19 (d)**

**WHITE KNIGHT MK II**
(Specify if for Master). Disc **£16 (d)**

**BATTLEFIELDS** Cass **£8.50 (d)**

**DEUTSCH DIREKT**
Disc based vocabulary learning prog with audio cassette to help with pronounciation. Disc/aud/EC **£16 (c)** Book **£5.95 (d)**

**A VOUS LA FRANCE**
A home study aid for anyone learning French. Cass/EC **£12 (d)** Book **£5.25 (d)**

**Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per disc and please specify the format required 40 or 80T.**

## PRINTER ACCESSORIES

**EPSON ACCESSORIES:**

**Interfaces:**
8143 RS232 ........ £28 (d)
8148 + RS232 + 8K ........ £65 (d)
8165 IEEE + Cable ........ £65 (d)
8148 RS232 + 2K ........ £57 (d)
8132 Apple II ........ £60 (d)
8177P NLQ for FX80 + /FX100 + ........ £99 (d)
Parallel & Serial Buffers of various size also available.
**FX80/80 + /85** Tractor Attachment ........ £37 (c)
**FX80/80 +** Paper Roll Holder ........ £17 (c)
**LX80** Tractor Feed ........ £20 (d)
**LQ800** Tractor Feed ........ £44 (b)
**LQ1000** Tractor Feed ........ £49 (b)

**SHEET FEEDERS:**
**8338** LX80 ........ £49 (b)
**8333** FX100 + /105 ........ £169 (a)
**8331** FX80 + /85 ........ £129 (b)
**8330** RX80 + ........ £129 (b)
**LQ800** ........ £129 (b)
**LQ1000** ........ £159 (b)

**Ribbons:**
RX/FX100/100 + . FX105 ........ £10 (d)
RX/FX80/80 + , FX85 ........ £5 (d)
LX80 ........ £4.50 (d)
LQ800 ........ £8.50 (d)
LQ1000 ........ £10 (d)
H180 Pen Set (Aqueous/Ball point) ........ £7.50 (d)

**Dust Covers:**
FX80 ........ £5.50 (d)
TAXAN/Canon KP810 ........ £6 (d)
FX100 ........ £7.50 (d) **KP910 £7 (d)**

**HITACHI 672 Plotter**
Aqueous Pen Set six pens ........ £18.50 (d)
Oil Based Pen Set six pens ........ £25.00 (d)

**TAXAN CANON Accessories:**
RS232 + 2K buffer ........ £78 (d)
Ribbon ........ £6 (d)

**JUKI 6100**
RS232 Interfaces ........ £65 (d)
Tractor Feed ........ £129 (a)
Ribbon (Carbon) ........ £2.00 (d)
Spare Daisy Wheel ........ £14 (d)
Sheet Feeder ........ £182 (a)

**BROTHER HR15**
Daisy Wheel ........ £18 (d)
Tractor Feed ........ £90 (a)
Ribbon (Carbon/Nylon) ........ £3.00 (d)
Sheet Feeder ........ £182 (d)
Keyboard ........ £135 (a)

**Printer Leads:**
BBC Parallel Lead (1.2m) ........ £10 (d)
BBC Serial Lead (1.2m) ........ £6 (d)
**Other lengths can be supplied on order:**
IBM Parallel Lead (2m) ........ £12 (d)

**PAPER & LABELS**
**Plain Fanfold paper** with micro perforations:
2000 sheets 9½" × 11" ........ £13 (b)
2000 sheets 14½" × 11" ........ £18.50 (£4.50)

**Labels/1000:**
Single Row 3½ × 1 7/16" ........ £5.25 (d)
Triple Row 27/16" × 17/16" ........ £5 (d)

### *BBC SPARE PARTS*

**All Prices are Retail ex-VAT carriage code (d).**

**BBC & Misc:**
Keyboards ........ £52 (b)
Powers Supply £52 (b)
Keyswitch ........ £1.75
Video ULA ........ £18
Serial ULA ........ £14
DNFS ........ £18
UHF MOD ........ £4.50
6502A CPU ........ £6.50
65CO2 CPU ........ £12
6522 VIA ........ £3.50
6522A VIA ........ £5.50
LM324 ........ £0.45
74ALS 245 ........ £5
88LS120 ........ £3.00

**BBC PLUS:**
PAL16REN ........ £13.50
64K × 4 DRAM ........ £8.50
6512A ........ £12.50
SAA5050 ........ £9.00
6845SP ........ £6.50
UPD7002 ........ £5.00
DS3691 ........ £3.50
7438 ........ £0.40
74LSOO ........ £0.24
74LSO4 ........ £0.24
74LS10 ........ £0.24
74LS123 ........ £0.80
74LS163 ........ £0.75
74LS244 ........ £0.80
74LS245 ........ £1.10
74LS373 ........ £0.90
74LS393 ........ £1.00

**BBC MASTER:**
1-Mbit ROM ........ £39
MSI CHROMA IC ........ £13.50
65SC12P-2 ........ £12.50

Look for the holly symbols and then see page 5 for our special XMAS offers.

# TECHNOMATIC

**17 Burnley Road, London NW10 1ED Tel: 01-208 1177**
**305 Edgware Road, London W2 Tel: 01-723 0233**

## ACW443 CAMBRIDGE WORKSTATION

A complete self-contained workstation with:.

* NS32016 8MHz Main Processor & 32081 FP processor.
* 20 Mbyte Winchester and one 80T Ds floppy drive.
* A detachable keyboard Hi Res RGB Monitor.
* 4Mbyte of on board Ram as standard.
* Languages supplied include: Fortran 77, Pascal, C, Cambridge LISP, 32016 Assembler & 32bit BASIC.
* Utilities on the operating system to cross link programs between different languages, utilities for porting programs to mainframes.
* **Phone for detailed leaflet.**

## 32016 CO-PROCESSOR

***A second processor that brings genuine 'Mainframe' power to the BBC Computer.***

* Interfaces with the BBC through the tube connector.
* NS32016 6MHz CPU & 32081 FP processor.
* 1Mbyte Ram as standard.
* Packaged software includes all the languages and utilities supplied with the ACW Work Station.
* **Phone for detailed leaflet.**

CPU/FP Upgrade Kit (non-Acorn) for the Co Processor for 10Mhz operation to enable faster processing. It can be fitted at no extra charge if ordered with the Co Processor.

**A list of software available for the 32 bit processors is available on request.**

## 512 CO-PROCESSOR

***Brings professional software to the BBC Master.***

* 10 Mhz 80186 *DOS PLUS.
* GEM Write & GEM Draw.
* 'WIMP' Environment with high quality Mouse.
* Runs many 'IBM' programs — even 'Flight Simulator'!
* Convert to/from IBM/BBC data.

## DOTPRINT PLUS

***A uniquely versatile NLQ ROM for the BBC Micro.***

* Built-in character font generator.
* Built-in view printer driver.
* Supports microspacing for professional justification in View & with disc in Wordwise/Plus.
* True bold print as well as double width.
* 12 character pitch as standard.
* Fully variable pitch and line spacing.
* Suitable for fully **'EPSON'** compatible printers with quad-density graphics.
* **DOTPRINT PLUS** for EPSON FX/RX and compatibles.
* **DOTPRINT DUAL** for EPSON MX range.

### MICROJUSTIFIED TEXT

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their

### NORMALLY JUSTIFIED TEXT

homes of a ruling class whose right to rule was based on the ownership of land. Large estates produced money; perhaps even more important, they supplied people to fight for their

***Notice how MICROJUSTIFICATION eliminates 'stretched' spaces between words.***

# Special Xmas Offers

**During this festive season of 'goodwill etc' we are offering a selection from our range of equipment either at a special price or including added value in the normal price. All offers will be valid for orders received upto 10th January.**

**TAXAN SuperVision III** including a BBC lead at a never to be repeated price of **£289 (a) + VAT**

**BBC MASTER AMB15** will be supplied with two Acorn Eprom Cartridges.

**TAXAN SuperVision II** including a BBC lead at **£249 (a) + VAT.**

**BBC MASTER Compact Systems** will include two packs (20 discs) of 3.5" 80T DSDD Discs.

**Miracle WS3000 & WS4000** range modems will be supplied with a free COMMSTAR II and a BBC data cable.

**Multiform Z80** with Pocket Wordstar and MS/PC DOS Read/Write Utility **£259 (a)**

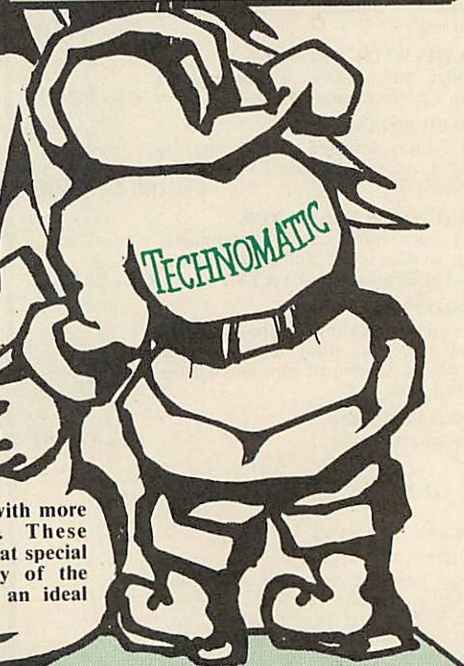
**EPROMER IIs** will be supplied at a special price of **£69** while the stocks last.

**Every printer** will be supplied with a BBC printer lead, a spare ribbon and 1000 sheets of fanfold paper.

SPECIAL OFFER ON LIMITED STOCKS OF **EPSON FX85** PRINTERS only **£289 (a)**

**All floppy drives** will be supplied with a **free FLOPPICLENE** kit to enable you to maintain the high performance of the drive.

**Microvitec** 1451, 1451AP and 1441 monitors supplied in plastic cases will be supplied with a swivel stand at no extra charge.




**TECHNOMATIC are launching two new utility packages this month which will enable you to use some of your packages with more ease and efficiency. These packages will be offered at special introductory prices. Any of the two packages could be an ideal Xmas gift.**

**WYSIWYG Plus:** As the name implies, this utility will let you print exactly what you see on the screen either in BASIC or even within Wordwise plus. Full details on page 7. **Special Introductory price £19(d)**

**WINDOMATIC:** This is a VIEWSHEET window editor, designed to get the best from Acorn's powerful spreadsheet program. It provides a quick and easy way to configure on the screen and printer allowing complicated documents. Full details on page 9. **Special introductory price £15 (d).**

This month we are adding the Database Publication's MINI OFFICE II Rom Board to our range and are offering it at a special launch price.

**MINI OFFICE II** Rom Board includes four 32K roms that provide powerful and fast wordprocessing, spreadsheet and database facilities and utilities for communications, graphics and label printing. Compatible with all of Acorn's filing systems and shadow ram. Easy to instal. **£48 (c).**

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(24 hr viewdata system)
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For fast delivery telephone your order on 01-208 1177 using VISA/Access Card

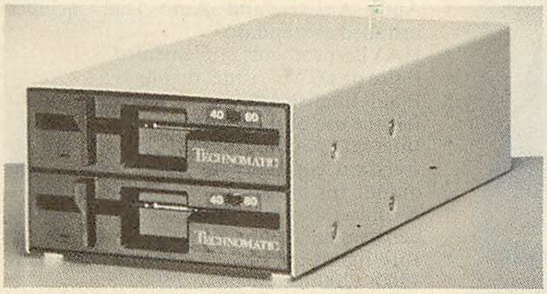
Orders welcome from government depts & educational establishments.

All prices ex VAT.
Prices are subject to change without notice.

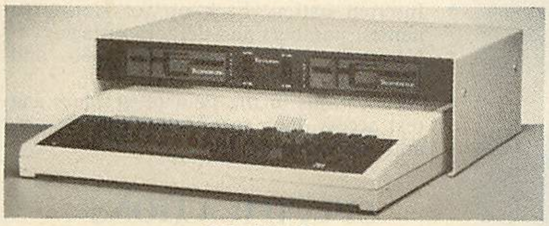
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(d) £1.00



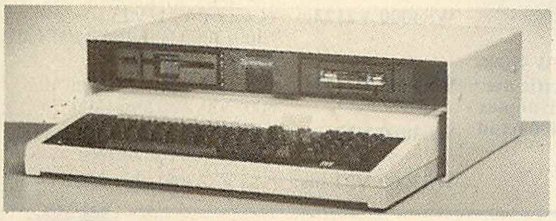
TS 400



PD 800



PD 800 P



P2041 HT

# DISC DRIVES

**TECHNOMATIC offers a wide range of high quality, high performance drives to meet all needs of BBC micro users. Please see our detailed and competitive price list on page 2.**

*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering very fast track access and head settling times.

*5.25″ floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*The plinth version drives provide for a neat and compact system installation giving it a more professional look.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with suitably fused 13A moulded plug.

# WINCHESTER DRIVES

Mass storage 20 Mbyte drives are available in the following versions:

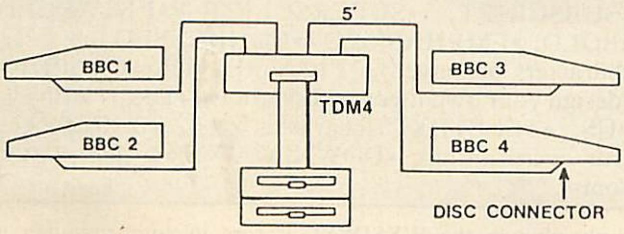
* P20HD Stand alone.
* P204HP With a single floppy housed in a plinth version case.
* P214TS Top of the range with a 10 Mbyte back up streamer and a single floppy housed in a plinth type casing and supplied with backup utilities.
* TS10 A stand alone 10Mbyte streamer for those who are already equipped with a Winchester and a floppy drive. Utilities for backup can only be loaded from a floppy.

All models are fully compatible with Acorn's ADFS system and include a mains psu and the necessary cable connections.

***ALL TECHNOMATIC DRIVES NOW CARRY A TWO YEAR WARRANTY***

## *DISC DRIVE MULTIPLEXER*

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5′ of cable per outlet as standard. Mains powered.




**TDM4** Quad Unit (up to 4 computers)
**TDM2** Dual Unit (2 computers)

## WINCHESTER DRIVE MULTIPLEXER

A unique addition to our hardware range that allows the sharing of a Winchester between a number of computers. The principle of operation is the same as our highly popular disc drive multiplexers and there is no need for any additional software or hardware modifications. The Multiplexers are available in two versions, a dual unit for two computers and a quad unit for four computers to share a Winchester. Multiplexers are particularly useful for accessing common software and transferring data between the computers. (Not recommended for use with randon access files).

## 3M FLOPPY DISCS

**FREE Clock/calculator with every 5 boxes of 3M discs purchased.**



Every single 3M Floppy Disc carries a written lifetime guarantee that it will perform reliably. Not only do 3M offer a highest quality product but also a very competitive price. Please see page 2 for details. 3M Floppy Discs are supplied in sturdy storage boxes each containing 10 discs.
**While offer lasts discs will be supplied at specially reduced prices.**

## FLOPPICLENE Disc Drive Cleaning Kit

Floppiclene introduces a positive concept in ensuring continuous high performance of the disc drives by providing an easy and efficient method of keeping the drive heads clean. Use of disposable cleaning discs eliminates the risk always present in reuseable discs of recontamination and abrasion of the sensitive drive heads. Available for both 5.25″ and 3.5″ drives. Please see page 2 for prices.

Look for the holly symbols and then see page 5 for our special XMAS offers.

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# MODEMS

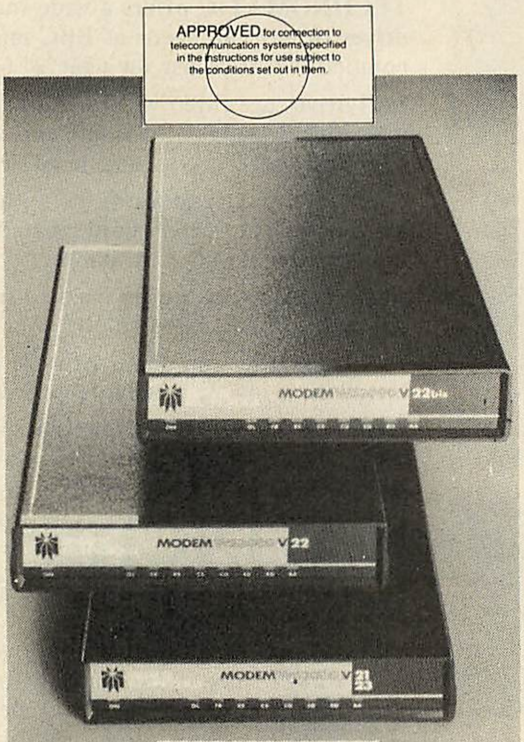
## MIRACLE WS4000

* A cost effective intelligent modem that offers the best value for money bringing the world of data communication within easy reach.
* Plain English commands make it simple to use, even for the first time user.
* Latest Hayes-type protocol commands, auto dial, auto answer, auto speed seeking.
* Equalisation model in V23 for line-noise filtering.
* Many other options including upgrading to V22 and V22 bis.

## MIRACLE WS2000

* A comprehensive manually switched 'World Standard' modem.
* Competitively price with a capability to be upgraded for various options.
* BT approved for V21/V23, 300/300, 1200/75 and 1200/1200 half duplex.
* Includes BEL103/113/108 standards for use outside UK.

Optional extras include (Not BT approved).
* SK1 chip set for computer control.
* User port cable.
* Auto dial Board.
* Auto Answer Board.
* DS1 disc for auto dial facilities on Commstar.




WS 3000 Range

**Miracle have introduced two new models in the WS3000 series for users who require a modem for a specific use. Model WS3022 provides 1200/1200 baud full duplex operation whilst only WS3024 provides 2400/2400 baud fd only.**

***Please see page 2 for prices***

## MIRACLE WS3000 RANGE

* A professional range of intelligent modems with full BABT approval.
* Auto Answer and Auto Dial facilities installed as standard.
* HAYES protocols implemented.
* Pulse or DTMF 'tone' dialing.
* Plain English command structure simplifies the use of the modem.
* Integral parallel printer port fitted as standard configurable for both input and output for process control applications.
* A line sharing facility to differential between data and voice calls.
* Intelligent speed buffering converts 1200/1200 terminals to 1200/75
* Equalisation mode for line noise filtering.
* Internal battery back up for storing 63 names, numbers and default settings.
* Upgrade path for 1200/1200 and 2400/2400 and security encryption.
* Applications in the field of graphics and text access, high speed telex, user to user, and user to main frame.

## SPECIFICATIONS

| | |
|---|---|
| **WS4000 V2123:** | *CCITT V21/V23. *300/300, 600 and 1200 half duplex, 1200/75. |
| **WS3000 V2123:** | *CCITT V21/V23/Bell 103. 300/300, 600 and 1200/75 |
| **WS3000 V22:** | *As V2123 and also 1200/1200 full duplex. |
| **WS3000 V22 bis:** | *As V22 and also 2400/2400. |

# MULTIFORM Z80

## *A unique Z80 2nd Processor with a 'MULTI FORMAT' capability.*

*includes a FREE Pocket Wordstar package*

* Multiform Z80 will run most CP/M 2.2 formats on the BBC.
* 28 different formats including Acorn Z80, RML 380Z & 480Z, EPSON QX, Amstrad, Osborne etc, supplied on the library disc with the utility to create additional formats.
* Emulates the two of the most commonly used CP/M terminals, HAZELTINE 1500 and ADM-3a in addition to the Acorn VDU making installation of most of the software packages easy.
* Utility to inter convert ASCII text wordprocessed on a standard BBC and under OS/M or CP/M .
* 8271 allows single density CP/M formats whilst 1770 DFS allows both single and double density CP/M formats. Single or dual drive, 40 or 80 track format and SS or DS drives can be used providing the CP/M format matches.
* Dual drive will allow two separate formats to operate simultaneously for data transfer making it ideal for use in environment where machines with different formats are in use.
* Utility to read and write on IBM PC DOS discs available as an optional extra. Utility will also format a PC DOS disc.
* Multiform Z80 is supplied with a OS/M operating system rom, System disc and a Library disc. Please specify the DFS type and the drive format when ordering.

# WYSIWYG PLUS

NEW

This new screen/printer utility not only allows you to see on the screen exactly how the text is going to appear on the paper when printed but also simplifies the printer control codes that you need to use to get the different effects.

**WYSIWYG+** can be used in BASIC or from within the popular word processor WORDWISE plus.

The printer commands have been simplified to meaningful words so that the user does not have to either remember or keep referring to the printer manual and try to decode the commands to VDU format. For example: *ENGLARGED will display enlarged text on the screen and send the appropriate command to the printer to print in enlarged mode.

**Some of the features you could see in WW+ or from BASIC include:**
*SUBSCRIPT, *SUPERSCRIPT, *ENLARGED, *BOLD, *EMPHASISED, *CONDENSED (up to 132 characters on screen), *PICA, *ELITE, *GRAPHICS (design your own logos and symbols), *UK, *FRENCH, *US, *TELETEXT (character sets), *BACKSPACE (for overprinting), *DOWNLOAD (new characters or fonts).

Simply plug in the WYSIWYG+ rom in your computer and utilise the features built in to your printer with ease and least bother to produce the results you know are possible but not so simple to achieve. No other single package offers this much flexibility and simplicity to get the best from your printer.

**WYSIWYG+** rom is supplied with a comprehensive manual.

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**(c) £1.50**
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# EPROMER III Eprom Programmer

An enhanced version of the highly successful EPROMER II providing added sophistication to the eprom programming applications on the BBC computer range. The new software also utilises the extra facilities of the BBC Master computer. The programming methods are 'state of the art' of programming technology for fast, efficient and cost effective operation.

**The single rail eproms handled by the EPROMER III are:**

- 2716 2732 2764 27128 27256 27512 27513 27011 2516 2532 2564 (NMOS & CMOS)
- One time eproms P27XXX, 87CXXX etc.
- Also A suffix eproms such as 27XXXA

The software is menu driven, many operations being single key. On screen help clarifying the operation being carried out. Will make the programming process very simple and easy for both specialists and novices alike.

**The main features of the programming software are:**

* Device, function and voltage selection from the computer keyboard.
* Continuous display of the options selected.
* All eproms upto 27512 (64K) programmed in single pass.
* Automatic Intelligent identifier support for eproms able to respond.
* Selectable programming voltage 25/21/12.5V
* 3 programming methods: Normal, Intelligent & Pulse (20 sec for a 27128).
* Serial port protocols supported.
* Intel HEX, Motorola S, HEX and ASCII protocols supported.
* DFS, NFS, ADFS and Rom Filing System Supported.
* BASIC/Machine Code programming using RFS.
* Powerful editor with input in HEX or ASCII.
* Full editable 64K file.
* Block move of data within the address range.
* User can select any section of the eprom from single byte to the full address range to blank check/burn/verify. Facility to program single bytes makes program development/amendment simpler.
* Multiple loading for ROM Filing System

**EPROMER III interfaces with the BBC through the 1 MHz bus, has a mains power supply and is fitted with a 3M TEXTOOL ZIF socket to provide consistent and reliable service for a long period.**

# META Version III

*"All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach."* **Acorn User October 1986**

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc — and 68000 — using native mnemonics for each processor, eg. LD A, (HL) for Z80 and MOV AO, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassemblers.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc — all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF supression/addition etc.
- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-band manual, function-key strip.

## PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
- Load at 4Kbytes/second — No "erase" time.
- 28 pin header plugs into Eprom socket on target system — status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
- Fully CMOS compatible; draws no power from target system.
- Four portals may be independently programmed off same user-post cable.
- Complete with all cables, manual and disc.

**PORTAL 128** (2716, 2732, 2764, 27128):
**PORTAL 512** (2716, 2732, 2764, 27128, 27256, 27512).

## MICROPROMER

An add on unit for Epromer II enabling the user to program 8741, 8748 and 8749 single chip microcontrollers. Now with the aid of cross assemblers such as META, the user can write code for the above devices and then with the aid of Micropromer program the device.

* Simple menu structure with on screen help. i.e. select a function and on the screen will appear details of the function being performed.
* Comprehensive error reporting and checking.
* Read, verify, blank check, program from 1 to the maximum byte count for the device being used at any address location.
* Support for DFS, ADFS and cassette filing systems.
* Edit data in Hex or ASCII.
* Total control via software, no switches to worry about.
* Supplied with user manual and software on diskette.
* MPROMER simply plugs into the EPROMER II ZIF socket.

## TEAM DISSASSEMBLER

The third part of the Universal Development System: a Meta labelling dissassembler.

Supports 1802, 8080, 8085, HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc): updates soon for most of Meta processors.

- Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
- Pre-editing stage allows marking of object code areas as byte, string, word, long word etc, tables. These areas dis-assembled into appropriate directives instead of garbage mnemonics.
- Reconstituted source code ready for immediate re-assembly by META.
- Omniversal search/replace for re-naming arbitary label names with meaningful ones.

## BOOKS

**No VAT Carriage Code (c)**

**LANGUAGES**
6502 Assy Lang Prog............£19.95
6502 Programming..............£13.95
8086 Book......................£23.95
Acorn BCPL User Guide........£15.00
Acorn FORTH.....................£7.50
Acorn LISP.......................£7.50
Acorn ISO Pascal Ref Manual.£10.00
Intro to COMAL.................£10.00
Intro to LOGO....................£7.50
Micro Prolog Ref Manual.......£10.00
Introduction to Turbo Pascal..£14.95
Prog the Micro with Pascal.......£8.50
The UNIX Book...................£7.50
Unix User Guide................£19.95
Understanding Unix............£18.45

**BBC MICRO GUIDE BOOKS**
BBC User Guide Acorn..........£15.00
BBC Plus User Guide...........£15.00
Drawing your Own BBC Programs.........................£6.95
Inside Information...............£8.95
Math Prog in BBC Basic.........£7.95
Toolbox 2.........................£10.95
VIA 6522 Book....................£4.50

**PROGRAMMING/UTILITY**
Advanced Sidewise Ram User Guide.........£9.95
Advanced User Guide (BBC)...£15.95
Advanced User Guide...........£12.50
Applied Ass./Lang on the BBC.£9.95
BBC Micro Sideways ROM's RAM's.........£9.95
Guide to the BBC ROM..........£9.95
Beginners Guide to W.P.........£7.95
View 3.0 User Guide.............£10.00
Viewstore.........................£10.00
Viewsheet.........................£10.00
Wordwise Plus....................£9.95

**SOUND & GRAPHICS:**
Mastering Music..................£6.95

**DISC DRIVE SYSTEMS:**
Advanced Disc User Guide.....£16.95
Disc Book..........................£3.50
Disc Programming Techniques..£7.95
Disc Systems.......................£6.95
File Handling on the BBC........£6.95
Discovering Disc Drives.........£POA

**APPLICATIONS:**
Interfacing Proj for BBC.........£6.95
BBC and Small Business.........£5.75

**PROFESSIONAL SOFTWARE**
Wordstar made easy.............£16.95
Introduction to Wordstar.......£17.95
Wordstar Handbook.............£11.95
dBase-II for the first time user.£16.95
Understanding dBase-III........£22.95
Multiplan Made Easy............£18.95
Multimate Complete Guide.....£16.95
ABC of LOTUS 123..............£17.45
1-2-3 for Business..............£16.95
Adv Tech in dBase II/III........£22.95
Mastering CP/M..................£17.95
CP/M Bible........................£16.50
Introducing CP/M on BBC & Z80..........................£9.95
MS/PC DOS Prompt.............£10.95

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# NOVACAD

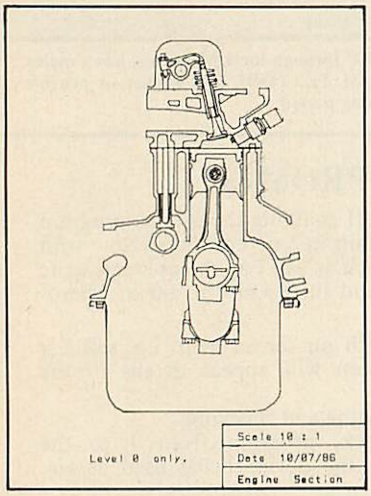
## *Computer Aided Draughting for the BBC Micro*

*" The Novacad system is a thoughtfully designed piece of software requiring a minimum of manual bashing so that real results are possible with just a few hours work. "*

*" Novacad is a professional package, well worth the £90 for the ROM and disc and is expandable to suit your own particular requirements. I would have no reservations if I heard Novacad called, "the best on the market". "* **A&B Computing August 1986**

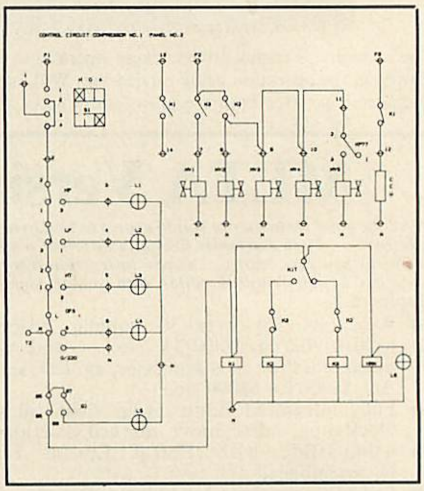
A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing professional quality output are making extensive use of NOVACAD's unique features. NOVACAD is proving to be a invaluable teaching aid in technical schools and colleges simply because of the ease with which it can be used.




### The major features of NOVACAD are:

* Simple and easy to use with logical command sequence.
* A large drawing area (approx 15 screens).
* The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
* A zoom facility allowing magnification of up to 20 times to insert finer details.
* Block copy of shapes on the screen for repetitive use.
* Text entry at any 90° orientation at any position on the screen.
* Create multi layer drawing with 8 levels available.
* Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
* Printer routine for Epson 80 and 136 column printers.
* A unique facility to output to any BBC compatible plotter.



### MINIMUM HARDWARE REQUIREMENTS

- **Any BBC range computer with Acorn DFS.**
- **40 Track single sided single drive.**
- **Epson compatible dot matrix printer.**

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours. With shadow memory of the BBC+ or the Master, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will provide additional user memory for more complex drawings.

6502 second processor or the Turbo on the Master will also increase the drawing speed considerably.

### NOVACAD

**is available in two versions**

*BASIC version for cursor control from the keyboard.

*T/M version for cursor control from the keyboard. Tracker Ball or a Mouse.

### OPTIONAL EXTRAS

**Plotter driver generator** is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Preconfigured programs for the popular plotters like **Epson HI 80, Hitachi 672, Plotmate, Penman** and **HP GL.** This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

**ROUTCAD,** an optional software package for our Graphics Workstation allows for production of shapes drawn using NOVACAD in 3D on suitable material and is ideal for a range of applications including template making and model building.

***NOVACAD package includes a 16K ROM, Utility disc and a comprehensive manual.***

# NEW WINDOMATIC NEW

All users of Acorn's VIEWSHEET spreadsheet program will be aware of its powerful windowing facility which allows the screen and/or printer to be configured in upto 10 separate windows taken from anywhere in the sheet. They will also be painfully aware of how difficult and time consuming it is to set up a required display. Although VIEWSHEET allows configurations to be saved to the media, it does not have provision for deciphering them.

**WINDOWMATIC** has been produced with the intention of recitifying these shortcomings and to bring out the very best from VIEWSHEET.

**WINDOMATIC** provides a quick and easy way to configure screen and printer allowing complicated documents and reports to be set up much more easily. It displays complete text information on all 20 windows and accurate *graphic* representation of the screen and printer output.

The package includes a screen dump routine for Epson printers and allows use of other printer dump packages.

The program is compatible with BBC Master, B+ and 6502 and Turbo second processors. It can be entered from VIEWSHEET by use of function keys or it may be run by loading a previously saved window configuration from disc.

The program is supplied on a disc with a comprehensive manual.

# LETTERS

Write to Letters, Acorn User, 141-143 Drury Lane, London WC2B 5TF

## SKILLS ARE IMPORTANT

Sir, While the intent of my original letter (October issue) was to stimulate discussion, rather than argument, I must take issue with some of the points raised in Mr Hunter's reply (December issue).

I don't think my letter was misleading. Certainly, many teachers are of the opinion they should not encourage programming type projects. I am pleased to hear the new GCSE syllabi support programming.

In real terms his approach to programming is very close to the philosophy of the Jottings column, with the exception that I firmly believe that skills are acquired by many and varied practical experiences, rather than directly by teaching.

As I mentioned previously the fate of Information Technology lies in the hands of SEC, where an unwise judgement could remove IT at GCSE level from school curricula. The fact IT syllabi tend to be skills based, is laudable, what on earth else is there for children to learn? Skills provide both the tools for handling factual knowledge, and the vehicle to acquire concepts. Without practical, thinking, communication and social skills, our children would be totally lost. It is best to assess many skills and concepts as a course progresses.

The comment about programming in other subject areas misses the point I made. A child who at age eight, draws a Logo square is by her actions indicating she has acquired a wide range of mathematical skills. The secondary pupil who writes an adventure game using say Quill is indicating similar language ability. These must be the most relevant computing solutions of all, ones which are generated by a real need on the part of the pupil.

Joe Telford
Cleveland

## SPACED OUT INTERWORD

Sir, Following the review of *Interword*, 'Fanfare for Interword', I investigated Bruce Smith's criticism, namely that line spacing can only be set once and not changed during printing.

I found this can be overcome by using the embedded command menu on f1. Normal line spacing on my printer (Canon PW-1080A) is 1/6in. By using the control code for n/72in line spacing (VDU 1, 27, 1, 65, 1, n), double, triple and back to single line spacing can be altered at will. The embedded command 27, 65, n will set the line spacing as required, substituting for 'n' the values 12, 24 and 36 for single, double and triple spacing. Obviously other values can be substituted for 'n' to give any fraction of a 72nd of an inch spacing which may be needed.

I don't imagine even professional writers are changing line spacing all that often and if they are, function keys can be programmed to save typing out the whole command every time.

Unfortunately, this does not overcome Mr. Smith's other criticism concerning the implementation of the line counter. The only way I found to get round this was to first print the document on continuous stationery and manually insert the page breaks after from the print out.

P G Bradburn
Worcestershire

**Bruce Smith's comment was made with the experience of writing 15 books using *Wordwise*, and a couple with *View*.**

**The ability to change line spacing is often vital for such work. Publishers insist on double spaced copy, but double-spaced listings or tabular material are a pain, and the difficultly of switching between the two in *Interword* means that *View* or *Wordwise* are still favourite for writing books.**

## A SCRIBE WRITES

Sir, I have read your magazine for some considerable time. During this period you have reviewed many wordprocessing packages. You have also, with great regularity carried an advertisement for the wordprocessor called *Scribe* from Merlin.

I cannot understand why I have not seen *Scribe* included in your reviews of wordprocessors. As a wordprocessor it has much to offer which others do not provide.

Do your reviewers disagree with my opinion or have they not cast their eyes further afield than the old chestnuts, *View* and *Wordwise*?

W J Bunton
London N7

**May we refer you to the January 1985 issue (page 143) where we carried a review of all the major wordprocessors – including *Scribe*. Also to January 1986 (page 133) where *Scribe* was covered in the business article on wordprocessors. The 'old chestnuts' receive more coverage because, there are more of them around and well supported by other software products.**

## TOO MUCH JARGON

Sir, I was pleased to read the letters from P D C Woollerton and J A Brook in the November issue and echo their sentiments wholeheartedly. It's good to know I am not the only oldie among all the computer whizz-kids!

Like Mr Brook, I have no real desire to learn how to program my BBC B, but in my job as Secretary/Treasurer to the local Mooring Authority I make good use of it for record-keeping using Gemini's *DDD-Base*. I found this quite difficult to master at the beginning, but fortunately Gemini were close at hand and most helpful. However, one cannot keep on asking them to explain everything in words of one syllable! I couldn't agree more that too much pre-knowledge is assumed and jargon used.

Iris Farrar-Hare
Devon

## DODGY DFS

Sir, I have recently been having trouble with some commercial programs not working with my double density DFS. If *AU* asked its readers to send in a list of programs which did not work with their DFS, then published a list for each DFS, this would save people time and money.

Here are a few to start off the list, Watford Electronics DDFS version 1.52 will not run Acornsoft *Elite*, Acornsoft *Revs* or *4-track*, Doctorsoft *Phantom Combat* or Melbourne House *The Hobbit*.

Steve Pearson
West Midlands

## BERLIN QUESTION

Sir, I have been using Acorn's Model B for two years now and since August I have been the proud owner of the new Master 512. But as Acorn no longer operate in Germany, my only source of information and news about Acorn computers, is your magazine.

Do you plan to publish some more background information about the Master 512? The User Guide delivered with the micro is of very little help and I am still waiting for an answer from Acorn to a letter I wrote two months ago.

I also would like to get in contact to other Acorn users, especially in Germany.

Thiess-Magnus Wolter
Berlin

**We have an article following up the review of the Master 512 being prepared for the New Year. In the meantime, you might well find it worthwhile joining one of the user groups. Big Ben in Holland are very good – and if their German is as good as their English, you'll have no trouble. They're at Hein Baderstraat 36, 2171 XP, Sassenheim, Netherlands.**

## RTTY TRANSMISSION

Sir, I reply to the letter in your October issue from Peter Baillie, regarding reception and transmission of RTTY with the Electron. Yes, it can be done and the following information may be of interest.

First, an external user port is available from: C Rudge, 5 Teal Close, Fareham, Hants PO16 8HG. Second, a program is available from: P Harris G3WHO, 10 Appleby Close, Great Alne, Alcester, Warwickshire B49 6HJ. Third, a PCB or completely boxed RTTY interface is available from myself for the Electron. This works the BBC, Master, Com 64, Com Plus 4, Amstrad, Apple and most other popular computers. Write to 2 Salters Court, Gosforth, Newcastle NE3 5BH.

By the way, nice mag.

Johnny Melvin
Tyne and Wear

## FILESERVER COMPARISONS

Sir, I have just read David Atherton's review of the SJ Fileserver. Although he ended up recommending the product over the Acorn equipment, I felt he missed out, or understated, at least three more reasons for buying from SJ.

First, the main advantage of the SJ fileservers is their space-accounting system. With this system users are allocated one or more of their own, or shared, account numbers, and each account number is given a certain amount of disc space. Without such a system there is no easy way to prevent users from saving, say, 160 mode 2 screens and causing everybody else to get disc full messages.

The second advantage of the SJ fileserver, is it comes with two built-in printer servers. Although, in theory, the Acorn system allows a print server station to be used as another network station, it is a restricted station.

A third advantage of the FDFS over level 2 Econet is the real time clock and the automatic date-stamping of files. This makes tracing the last version of a program a very simple job, and does not require the input of date and time every time the network is started up.

Richard Abbotts
East Sussex

## SJ BETTER THAN ACORN

Sir, About a year ago you were kind enough to mention a comparison of SJ and Acorn fileservers I had written. Can I therefore make a couple of points following on from David Atherton's review of the SJ FDFS which appeared in your November issue?

1) The distinction between level 2 (floppy discs) and level 3 (hard discs) is not very useful. The SJ FDFS includes all the features of an Acorn level 3 system, including the real time clock; this is one of a number of features not found on Acorn level 2 systems.

2) Anyone considering buying an SJ fileserver should consider whether the MDFS (Modular, ie, suitable for use with floppy and/or hard disc drives, which need not be the SJ hard disc units) represents a better investment.

Copies of my comparisons of the fileservers, with updates, covering a range of points not mentioned in your review can be obtained from me for £1.

On a second point, it's pleasing to see that most of your software listings will run on Econet (keep it up, please!) – but how about an indication of the Econet compatibility of the different programs on the many discs/tapes you now offer? In particular, is the UserDump ROM compatible?

Finally, can I please apologise to those readers who have written to me following previous mentions of our support group – I do reply to all letters eventually, but unless it's a simple matter of sending off one of our publications, I fear it takes some time! Please phone (0344) 57313 between 4.15pm and 5.30pm most evenings) or use TTNS (YLH025) whenever possible.

Georges Hawes
Berkshire

**Most of *Acorn User's* software runs on the Econet because the whole magazine is run on a 40-station system.**

**A list of Econet-compatibility is given for the *Acorn User* software range below. Finally, for network buffs, Robin Newman returns next month with the Econet page (several pages actually).**

| | DFS | ADFS | NFS |
|---|---|---|---|
| Assembler Extension ROM | Y | Y | Y |
| Best of Acorn User Cassette | Y | Y | Y |
| Bibliography | Y | 2 | 2 |
| Disc Help Disc | Y | 2 | 2 |
| Education Disc | Y | 2 | 2 |
| Finest Favourites Cassette | Y | Y | Y |
| Gallery Collection | Y | Y | Y |
| Gallery Disc | Y | Y | Y |
| Games Compendium Cassette | Y | Y | Y |
| Graphics Utilities Disc | Y | 2 | N |
| Listings Cassette/Disc | Y | 1 | 1 |
| Network Utilities Disc | N | N | Y |
| Print Help Disc | Y | 2 | 2 |
| Sideways RAM Utilities Disc | Y | 2 | Y |
| UserDump | Y | Y | Y |
| User ROM | Y | Y | Y |

Y Yes
N No
1 See index on yellow pages each month
2 Yes, but needs intelligent conversation

## KERMIT COMPUTES

Sir, First, a little help for Mr A D Jankowicz (Letters, November). Bitnet is an international network linking various mainframe and mini computers.

It will not be possible to set up an asynchronous link directly between his Master 128 and friend's PC through the network, so one of the machines (the Vax possibly) will have to be used as a file-store.

For plain text files he could 'spool' the text into a file on his machine and mail it (electronically) to his friend on the other machine, who could capture it with a terminal emulator.

A better approach would be to use the Kermit file transfer protocol. This allows any machine (that can run a version of Kermit) to send more or less any format from one machine to another. Kermit is available for around 150 different machines and was implemented for the BBC micro by Alan Phillips of Lancaster University. Every version of Kermit includes a terminal emulator so that you can log on to the computer you wish to transfer files to and from.

A BBC version of Kermit is available by downloading from Viewfax 258 on Prestel, and it is free of charge.

Anyone wanting more information on Kermit can contact me via Prestel (mailbox 919992633).

Michael Tabby
Leicester

---

Sir, 4 November 1986

In your November issue it was implied in the review of the Interword word processing package, that View was not capable of producing multi-column ducuments. However, (as can be seen from this letter) View is capable of producing text in two columns.

To be fair to the review, there is a problem, the drawback to the process being the need to put each sheet of paper through the printer twice.

The secret of two column printing in View does not seem to have appeared in Acorn User up to now, although I will be reading your planned series on using View with interest, and it may well be that the technique will be documented there.

The process takes advantage of the ability of View to produce two sided documents, reversing headers and footers on alternate pages. The Stored Command to use is
TS ON n
where n in the number of blank character spaces printed in the left margin of the odd numbered pages; the main reason for this feature is to allow extra margin for binding purposes. It can, however, be used to advantage to produce columns. To do this, set up a column width using a ruler, just less than half the width of the paper (say 38 characters wide)

Then invoke two sided printing with a large enough offset to print the right hand column without overlapping the left hand column: eg TS ON 42

The observant will realise that the first page of a document is page 1 which appears on the right: so as it stands this command will produce the right column before the left. To overcome this, either the page register |P must be changed to 2 or Ø before printing begins, or a PE (page eject) command inserted at the beginning of the document to 'throw away' the first page.

Once the document is set up on screen, and tested with SCREEN to see if the expected result has been achieved, the printing can be done, using the command SHEETS. This allows any page to be printed or skipped over in the printing process. Miss the first page if a PE starts the document: then print the next page which will be the left hand column. Now insert the same sheet of paper into the printer again and print the next 'page'. This will produce the right hand column.

Slightly long-winded, perhaps, but a useful technique for View users to master for more interesting documents.

Yours Faithfully,

Duncan Breckels

---

## MASTER LANGUAGES

Sir, I own a BBC B and I am considering a Master 128 with a view to purchasing the 512k upgrade. I am interested in what software is readily available for the Master 512, in addition to that supplied with the machine.

I am particularly concerned as to which languages are available. As a teacher I realise that a number of educational authorities now recommend the RML Nimbus which uses the same 80186 processor. Would it be possible to use software for the Nimbus on the Master 512?

R Williams
Essex

**Although the Master 512 and the RML Nimbus use the same microprocessor this is not the major reason for software compatibility between them. Both machines depend largely on software written for the IBM PC. IBM PC compatibles use one of the following microprocessors: 8088, 8086, 80186, 80286, 80386. All these have the same basic core instruction set.**

**The Master 512 can run many IBM PC programs. The reason why the Master 512 cannot use all IBM PC software is because it is based on a BBC micro.**

**On the whole, programming languages will run. Acorn said it has tested and found working: C from Lattice, Turbo Pascal from Borland and Logo from Software De Base (a Madrid company). There is no version of Prolog known to work.**

## KIWI ELK

Sir, I live in New Zealand and have read your April issue and I was impressed. I find your articles and reviews very well written and humourous.

I was wondering if you could tell me whether or not the following hardware is available for the Electron: AMX Mouse, light pen, Touchmaster and speech synthesiser.

Could you also tell me if there is an Acorn Club anywhere here in New Zealand?

Glenn Ward
Titirangi, Auckland

**An adapted version of the AMX Mouse package with AMX *Art* is available in the UK from Advanced Computer Products for use with the Advanced Plus 5 interface. The others are not available.**

**There is a thriving club for Kiwi Acorn owners, the BBC/Acorn Club of NZ. Membership costs $30 a year. Contact the club at PO Box 9592, Wellington, NZ.**

## STARRING ROLE

Sir, I have just been reading the short printer reviews in the November issue of *Acorn User*. I feel that I must make a few comments with reference to the Star NL10.

I have owned a Star NL10 for many months now and find it a superb printer in many respects. Your reviewer sadly missed out most of the unique features of this printer and stated that it was unable to do near letter quality italics. The latter is wrong, as the Star has a separate italic font unlike most which modify the standard font when in italics mode!

I know your reviewer didn't outline all the features of the other printers but he should have mentioned some of the Star's features as listed below, otherwise it has been done a great injustice:

- The front panel touch controls enable selection of NLQ, 80, 96, 136 column draft, bold, italics (draft and NLQ!), set top-of-form, move to top-of-form, forward and reverse paper feed, left and right margin setting, hex dump mode and two self-test routines. You can also tell the printer from the front panel to ignore any control codes sent to it by the computer and set alternatives from the panel.
- The printer has as standard, an automatic single sheet feeder that takes in one sheet at a time. A multi-sheet feeder is also available for the printer.
- There is the facility for downloadable characters (draft and NLQ) as standard.
- Changing ribbons is 'clean' You insert the cartridge and power-up the printer which automatically feeds the ribbon into the guides.
- The print head has a perspex guard on it that has alignment marks like most modern typewriters. Most useful!
- The printer is Fully Epson compatible even down to reverse feed as with the FX80.

There are many more features of this printer that make it a superb machine and sets new standards for low-cost dot matrix units. In the course of my work I have used many Epsons, the Kaga and Canon, the Juki 5100 and many others. They are no where near the Star in terms of print quality and facilities.

Sorry to have rattled on; I was incensed by your review.

**Peter West**
*Middlesex*

## EPSON HELP

Sir, I am writing to you for help. I won an Epson TX-80 printer, but I have no manual for it, I have phoned Epson (UK) Ltd., but they could not help me.

I have also made numerous enquiries elsewhere including Hereford Technical College but so far I haven't had any luck.

I have tried the various printer programs that have been published in *Acorn User* but none of them have worked.

I should be very grateful if someone could tell me where I may obtain a user manual for this printer.

**Stuart Davis**
*Worcestershire*

**Can readers help Stuart?**

## YELLOW PERIL

Sir, I write on the subject of yellow pages listings. No, not the usual, help! I spent hours typing it in and it won't work! My gripe is the legibility of the listings themselves. It sometimes looks as if the printer ribbon should have been replaced long ago or else the photocopier is on its last legs.

At first I thought of suggesting you reproduce the listings in normal type, but thinking a bit more about it, I suppose the reason they are photocopies of working listings is to cut out the errors that would undoubtedly occur in typesetting (there are enough errors as it is, as the Blunderbox testifies).

Surely though, you could reproduce a better quality photocopy? Or how about producing the listings on a daisywheel printer instead of a dot matrix? As a trained touch typist I don't suffer as much as the average two-finger variety. Let's face it, the hunt-and-prod typist finds it difficult enough as it is, so any help you can give them would be most appreciated, I am sure. Perhaps it would also cut the demands on the valuable time of *AU* staff in answering the help cries of frustrated keyboard bashers!

This criticism apart, a great magazine. Keep it up.

Paul Chandler
*Oxfordshire*

## POOR QUALITY

Sir, What are my rights as a software purchaser? I recently bought *Gyroscope* by Melbourne House. The game is, in my opinion, very poor indeed, being almost unplayable and bug-ridden. I returned the tape to Melbourne House four months ago. The inlay stated, 'combines synthesiser music with arcade action'. This is simply not true. The game plays in almost total silence.

Melbourne House has not replied to any of my letters and I now find myself without the tape or the £8.95 it cost.

David Clayton
*Lincolnshire*

**Your rights as a software buyer are exactly the same as those applying to the purchasers of any other goods. The product must be fit for the purpose for which it is sold and of 'merchantable quality'. If your game is really full of bugs then it cannot be said to have fulfilled this legal requirement. Also, if the game doesn't combine music and anything that could be described as arcade action then the product description on the inlay card was misleading.**

**However, your first action to rectify this should have been with the shop you bought the game from. In law, your contract is with the retailer and not the manufacturer. If, in fact, you bought the game direct from Melbourne House you were right to return it there.**

**Melbourne House apologise for the delay you have suffered and assure us you should be receiving a full refund shortly.**

## Z80 LIFELINE

Sir, I should like to endorse a recent letter concerning support for Z80 (Acorn) users.

Please keep up the info. Even if Acorn (especially if Acorn!) doesn't mind leaving us flat, we Z80 users look to specialist mags as our only lifeline!

R B Stodwell
*Dyfed*

## EVOLVING MEP

Sir, With reference to the article 'Hope for the future of MEP centres' in the October issue of *Acorn User*, you state that the MEP East Midlands Regional Centre, 'seems to have disappeared'.

In point of fact the function of the centre has now been taken over by the Regional East Midlands Information Technology Consortium (REMIT). The member authorities are Derbyshire, Lincolnshire, Leicestershire, Northamptonshire and Nottinghamshire.

I would be grateful if you can draw its existence to the attention of your readers.

C A Hadfield
*Leicester*

## ALAS POOR ORIC

Sir, I have just acquired a Master 128 to replace my now virtually redundant (though excellent) Oric Atmos. As it will be almost impossible to obtain a respectable sale price for the Atmos and its peripherals, it would seem prudent to make use of them if possible.

Obviously the printer presents no problem and it is now being used with my Master. The only other piece that may be of use is the 3in DOS. Would it be possible to have this modified to suit the Master? If so, who would be willing and able to carry out the operation and would it be financially viable?

R Wall
*Norfolk*

**Your Oric printer is easily used with a Master 128 as the Atmos used the same printer socket and pin-out as does the BBC micro and Master 128. However, the Atmos was based on the Z80 microprocessor and not the 6502 derivatives used in BBC micros. This means there is no way you can use the DOS supplied with the disc drive expansion for the Atmos.**

**However, you can use the 3in disc drive itself. The drives supplied for the Atmos are 'Shugart standard' drives, as required by the Master. You will need a new ribbon cable to connect the drive to the Master. Take the disc drive along to an Acorn dealer in your area. He should be able to supply a suitable lead which you can simply plug into the disc drive.**

**It would make most sense to use the drive as a second drive along with a standard 5.25in drive so you still read BBC micro discs. Your dealer should be able to supply a lead to connect both drives to the Master.**

## SURVEYING SOFTWARE

Sir, I read the letter referring to software for surveyors with interest. If the company concerned would care to contact me, I may well be able to help out. Write to: 13 Carnoustie, Home Farm, Bracknell, Berks.

If they could provide me with the calculations they have to make I would be prepared to attempt to write the required software in either Basic or 6502 machine code. Could you possibly either send me their address or forward the relevant parts of this letter to them.

On another note, Mike Rawlings' listing for Filing Sideways (Sept. '86) was found to be very useful for a piece of scientific equipment colleagues and I are developing.

J R Leighton
*Berkshire*

# SUBSCRIPTIONS

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# HINTS & TIPS

**Martin Phillips examines the use of loops to simplify tasks, also Wordwise, graphics, sound, teletext and disc filing system hints**

## LOOPS MAKE LIFE EASY

The power of the computer lies in the fact that it can be made to repeat a task quickly and easily many times. Bear this in mind when programming. I have seen many programs where a task is programmed step by step, yet with a little thought, it could have been programmed more simply using loops. An example is given in listing 1.

The program will draw the axes of a graph. As each line appears on the screen, it has been coded uniquely; this task is slow and tedious requiring a great deal of code and makes mistakes difficult to correct. Listing 2 will draw exactly the same graph, but this time loops have been used to simplify the task. The loops do not have to increment in units of one, they can increase or decrease in whatever units are

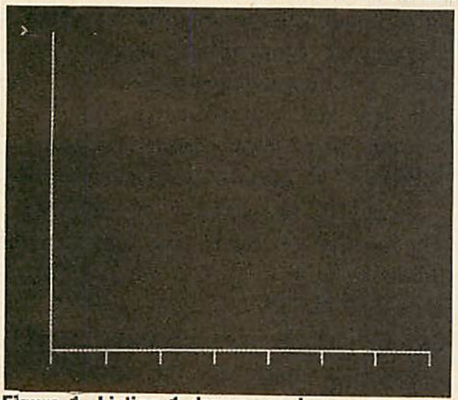


**Figure 1. Listing 1 draws graph axes**

by using the STEP statement. Neither does the loop have to start or end at any particular point. In this case the loop has the structure:

```
FOR X% 100 TO 1220 STEP 160
"
"
NEXT X%
```

With a little thought one of the MOVE statements has been made redundant. To save effort when programming graphics, try drawing the shape on a piece of paper first. Do it, however, by trying to lift the pencil off the paper as little as possible. The less the pencil is lifted off the paper, the less moves will be required. A small tip I use is to put the move and its associated draw statement on the same line. I find it helps to make the program easier to read, and when I see a draw statement on its own as in line 80, I know it will start drawing where the previous line left off.

Using the loops method, it is then very easy to improve the look of the graph. To put more markers on the axis needs only one line changing, eg:

```
90 FOR X%=100 TO 1220 STEP 40
```

Then for example, markers of different

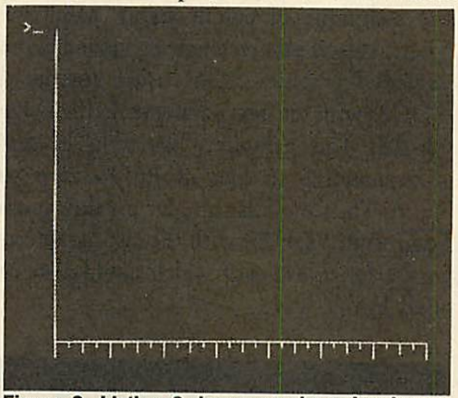


**Figure 2. Listing 2 draws graphs using loops**

lengths can be inserted. To do this the X% value can be tested using the 'MOD' statement after taking off the 100 for the starting position. The line length can be altered by using another variable, Y%. This can then be made to change depending on the position of X%. Listing 3 shows how this can be carried out. This listing is still shorter than Listing 1! The next step is to insert labels and values for each of the markers. It is debatable whether it is better to use the same loop to do this or have another loop. It depends on how complicated the scale of the graph is going to be.

## INDENTING WITH WORDWISE

In October's Hints and Tips, there was an article on indenting with *Wordwise*. There has been a flood of letters, well two actually, writing in to say that the example given could cause problems. If just one space is required after, say, a paragraph number, then unless the character '|' is used instead of a space, *Wordwise* might add extra spaces when justifying the text. My thanks go to D H Germain and also to Alan Pettie for pointing this fact out.

## THE EXTENDED GRAPHICS ROM

The extended graphics ROM chip was quite a novelty when it came out, but was of limited use because it was not certain if others had it installed in their machines, and so little commercial software was able to make use of it. Now however, both the Master and the Master Compact use the extended graphics ROM.

This will have a great effect on software designed for these machines. Gone are the days of trying to make fast routines to attempt to draw circles, or the problems of colouring in awkward shapes. The graphics ROM does it all. Documentation supplied with the Master or Compact is sketchy to say the least – the Master and Compact *Un*Welcome Guides give the extended colour fill routine a passing mention only. Part one of the Reference Manual says a bit more, but you're still left wondering how the ECF (extended colour fill) works.

Listing 4 shows a simple but interesting use of the extended colour fill. It draws a border on the screen, and then changes the background screen to red with yellow lines. The text is then changed to black to give an attractive, easy to read screen

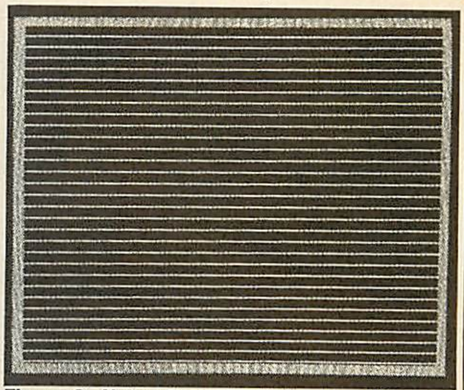


**Figure 3. Using the extended colour fill**

display. The border uses one of the standard colour fill patterns, the red and yellow pattern is a defined pattern. This pattern is defined in line 120 using the VDU23 call. The next number must be in the range of two to five, to set the ECF pattern from one to four. Then follow eight numbers in the range 0–255. To find the actual design to use, there is an ECF

definer on the Welcome disc of both the Master and the Compact. The numbers are printed down the left hand side, and are read from top to bottom. It is very easy to develop a pattern using this program.

To prepare the screen, the colour fill is then implemented for the full screen. The 'GCOL' statement sets the background (colour 128) to 32. This is ECF pattern two. The first parameter is made up as the following list illustrates:

| | |
|---|---|
| 16+n | for ECF pattern 1 |
| 32+n | for ECF pattern 2 |
| 48+n | for ECF pattern 3 |
| 64+n | for ECF pattern 4 |

The 'n' refers to the normal first GCOL parameter ie:

| | |
|---|---|
| n=0 | Overwrite the colour on the screen with ‹colour› |
| n=1 | OR the colour on the screen with ‹colour› |
| n=2 | AND the colour on the screen with ‹colour› |
| n=3 | EOR the colour on the screen with ‹colour› |
| n=4 | Invert the colour on the screen |
| n=5 | Leave the colour on the screen unchanged |

The screen is then cleared and it will clear to ECF pattern two. Next, a graphics window is created, one text pixel in from the edge of the screen and the next ECF pattern is selected. In this case it will be the one defined at line 80. Clearing the screen will give the red background with yellow lines and, because of the graphics window a border will be left round the edge of the screen. Last, the

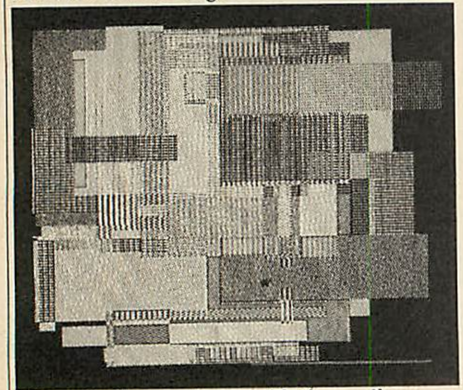


**Figure 4. Shapes drawn with the routine**

text colour is changed to black, and the cursor is homed. It is possible to make this a one-liner program. Compare this with listing 4:

```
10 MODE 1:VDU23,2,&F,&F,&F,&F,&F,&F,&FO,&F,5,18,32,128,16,24,32;32;124;8;992;18,16,128,16,18,0,0,30:PRINT"HELLO"
```

or even the following:

```
10 MODE 1:VDU23,2,&F,&F,&F,&F,&F,&F,&FO,&F,5,18,32,128,16,24,32;32;124;8;992;18,16,128,16,18,0,0,30,72,69,76,76,79
```

CLG has the VDU code of 16, GCOL has the VDU code 18, and the second version also has the 'Hello' put in as VDU codes. This sort of programming does not make debugging easy!

A simple demonstration of the versatility (and speed) of the ECF is shown in listing 5. This draws random rectangles on the screen but uses the extended colour fill option. The speed was so fast, a line was inserted to slow the program down! Again the program uses the technique of colour filling windows. There is also a plot rectangle command in the extended graphics ROM using command VDU25 with the next parameter in the range 95–103. The parameter variation is that corresponding to that of PLOT zero to seven. Then there is the plot parallelogram command, VDU25, with the last parameter in the range 112–119 which could also be used in this way.

## ANOTHER WORDWISE HINT

If you ever end up with a wordprocessed file full of spaces and return characters in the text, it makes any chance of correctly formatting the text impossible. The only way out of this is to remove all the returns and the spaces. This can take ages, especially as the returns can be difficult to spot. A better way to do this in *Wordwise* + is to go to the segment menu and write small segment program in segment zero:

```
SELECT TEXT
CURSOR TOP
REPEAT
REPLACE CHR$13,CHR$32
UNTIL EOT
CURSOR TOP
REPEAT
REPLACE CHR$" ",CHR$32
UNTIL EOT
```

This short routine will first remove all the return characters (CHR$13) embedded in the text and replace them with spaces (CHR$32), then it will go through the text replacing double spaces by a single space. Thus the routine strips out all returns and extra spaces in one go. It can be called up from the main menu by pressing Shift–f0.

Then there is the task of inserting returns in the places where they should go, such as for new paragraphs. However, a task which would have taken over an hour was completed in a few minutes.

## £10 MORLEY TELETEXT ADAPTOR

This month a £10 prize goes to 'Jaquier' who lives in Guernsey. The tip concerns the Morley Teletext Adaptor. The adaptor is a considerable improvement over the original Acorn Teletext Adaptor for its ease of use and because the ROM does not interfere with programs as the Acorn ROM did. There is now a ROM for the Acorn Teletext Adaptor produced by the BBC for the give-away price of £7.95 including manual, which is a great improvement.

Control over the pages called up by the inbuilt commands on the Morley Adaptor was upset by the broadcaster deciding to renumber its pages. One way to overcome this problem is to wait for Morley to provide an updated ROM. Another way is to program the function keys to do this. On the Morley system, the function keys can be programmed to hold strings of information corresponding to the key strokes required to change page request information. For example to call the catalogue page of BBC2 the following key sequence is required:

Press 'N' to select channel change
Press '2' to select channel number
Press '710' to select the page number

The function key can be programmed in the following way:

```
*KEY0 N2710
```

then by just one key press the page can be called. In a similar way the other function keys can be programmed to requirement giving quicker access to 10 predefined pages.

By using the *FX4,2 call, all the 15 function keys can be programmed. Break cannot be programmed or else the function key buffer will be flushed. The cursor key block can be programmed as follows to give a logical order:

```
*KEY12 N1
*KEY13 N2
*KEY14 N3
*KEY15 N4
```

## INPUT ROUTINE WITH SOUND

Paul Doherty from Bangor, County Down, has written in to ask if there is any way of getting the double height input routine to

work with *Speech!* He found it relatively simple to get the input number to be spoken as it was entered but had problems with the Delete key.

The solution is to try not to speak the correct number, but to have a special sound instead. When the delete key is pressed, you could use an 'oops' type sound, or the word 'sorry'. After all, you'd want to hear an incorrect entry to know the wrong key had been pressed. The danger is then that the delete key gets pressed all the more. Perhaps it should be programmed to say 'Not again'.

## FUNCTION KEY BUFFER

On the standard BBC micro, the function key buffer is located at page &B00. On the Master and Master Compact, this has changed. A common way of saving key definitions was to save this buffer area using a *SAVE command. This will not work on the newer machines. Hence it is better to include any key definitions in a !Boot file at the start of a program. This will then work on any machine.

## THE ACORN DISC FILING SYSTEM

The advanced disc filing system (ADFS) is available on the Master, Master Compact and Electron computers. It is quite a pleasant filing system to use once you get used to it.

For many BBC micro owners who have changed to the Master, there is the natural reaction to dislike it because it is different. The ADFS can be very useful allowing a far greater storage capacity on the disc and comes into its own when storing word-processed texts or large data files. It is easy to change files and programs from the ordinary disc filing system (DFS) to ADFS using the utility on the Welcome Disc.

A difference between the DFS and the ADFS is the fact all directories must be created first before any information is stored on them. Directories can be created by using the *CDIR command. This can be a nuisance, I usually get a rude unhelpful message from the ADFS before I remember to create all the directories needed. Most DFS directories are in the range A to Z, although other characters can be used. DFS directories must be single characters, although ADFS directories can be much longer. When converting programs from DFS to ADFS, only the single character need be used initially. Also note that a lower case 'a' is taken by both the DFS and the ADFS to be the same, a capital.

A simple way to put several directories on an ADFS disc is to program a function key:

```
*KEY0 OSCLI "CDIR "+GET$ |M
```

When function key 0 is pressed, part of the above line is printed out, then the computer waits for a key to be pressed. This key should be the directory to be created on the disc. For example, after programming the function key, to create a 'B' directory and a 'W' directory, press the function key then the 'B' key, then press the function key again and this time the 'W' key. Such a routine is only useful if you want to put a number of directories on a disc. There are actually many single characters that can be used on the normal DFS directories. The $ directory on ADFS will only hold 47 directories.

Many programs will convert to ADFS and run with no problem but programs requiring files to be loaded or saved might cause problems if the code has not been written using 'legal' Acorn commands. The 'legal' codes are those given in the Acorn disc guide, or the Master reference manuals. The only real problem I have experienced is with *DRIVE, which can be used in programs to call up another disc drive, eg:

```
*DRIVE 1
```

This will not work on ADFS and the *MOUNT command must be used instead. If the program can be listed then there is little problem, simply replace the *MOUNT for the *DRIVE commands.

A small problem can occur when a program disc has to be changed for a data disc. Before the program disc is removed a *BYE command should be issued, and after the data disc is inserted, a *MOUNT command should be issued.

The ADFS is a useful filing system and is well worth the trouble of getting to know.

## QUICKFIRE CORNER

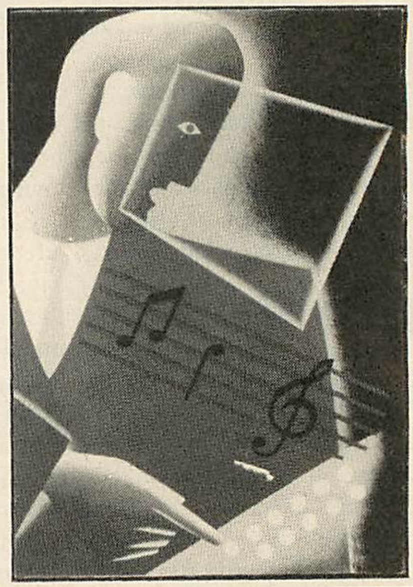
- When trying out listings which change screen colour, text often ends up in flashing colours, or worse still in black on a black background! Just typing CTRL-T will restore the normal colours.
- The screen can be cleared by pressing CTRL-L.
- Any screen windows can be cleared by pressing CTRL-Z.
- The cursor can be returned to the home position by pressing CTRL-*.

The listing below from Geoff Morris creates a machine code program which is called from *View* using *NAME.

It simulates the command 'NAME', available in *View 3* (not earlier versions). The command allows you to change the name by which a file is loaded. The document can then be save using 'save', without a file name.

```
   10 REM Hints & Tips
 - Listing 6
   20 REM *NAME for Vi
ew
   30 REM by Geoff Mor
ris
   40 REM for BBC B/B+
/E with View
   50 REM (c) Acorn Us
er January 1985
   60 :
   70 MODE 6
   80 FOR pass%=0 TO 3
 STEP 3
   90 P%=&900:[OPT pas
s%
  100 PHA:TXA:PHA:TYA:
PHA
  110 LDY #&FF
  120 .msg
  130 INY
  140 LDA text,Y
  150 JSR &FFEE
  160 BNE msg
  170 LDA #0
  180 LDX #param MOD 2
56
  190 LDY #param DIV 2
56
  200 JSR &FFF1
  210 LDA #&7D
  220 JSR &FFF4
  230 PLA:TAY:PLA:TAX:
PLA
  240 RTS
  250 ]
  260 param=P%
  270 !P%=&7CC
  280 P%?2=7
  290 P%?3=&2E
  300 P%?4=&7A
  310 P%=P%+5
  320 text=P%
  330 $text="New name?
 "+CHR$0
  340 P%=P%+LEN($text)
  350 NEXT pass%
  360 :
  370 *SAVE Name 900 +
100
  380 PRINT"Code saved
 as NAME"
  390 END
```

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```
 10 REM Hints & Tips - Listing 1
 20 REM by Martin Phillips
 30 REM for BBC B/B+/M/C/E
 40 REM (c) Acorn User January 1987
 50 :
 60 MODE 1
 70 MOVE 100,100
 80 DRAW 100,1000
 90 MOVE 100,100
100 DRAW 1220,100
110 MOVE 100,100
120 DRAW 100,60
130 MOVE 260,100
140 DRAW 260,60
150 MOVE 420,100
160 DRAW 420,60
170 MOVE 580,100
180 DRAW 580,60
190 MOVE 740,100
200 DRAW 740,60
210 MOVE 900,100
220 DRAW 900,60
230 MOVE 1060,100
240 DRAW 1060,60
250 MOVE 1220,100
260 DRAW 1220,60
```

**Listing 1. Draws a graph**

```
 10 REM Hints & Tips - Listing 2
 20 REM by Martin Phillips
 30 REM for BBC B/B+/M/C/E
 40 REM (c) Acorn User January 1987
 50 :
 60 MODE 1
 70 MOVE 100,1000
 80 DRAW 100,100
 90 DRAW 1220,100
100 FOR X%=100 TO 1220 STEP 160
110 MOVE X%,100
111 DRAW X%,60
120 NEXT X%
```

**Listing 2. Uses loops to draw the graph**

```
 10 REM Hints & Tips - Listing 3
 20 REM by Martin Phillips
 30 REM for BBC B/B+/M/C/E
 40 REM (c) Acorn User January 1987
 50 :
 60 MODE 1
 70 MOVE 100,1000
 80 DRAW 100,100
 90 DRAW 1220,100
100 FOR X%=100 TO 1220 STEP 40
110 Y%=84
120 IF (X%-100) MOD 80=0 THEN Y%=68
130 IF (X%-100) MOD 160=0 THEN Y%=52
140 MOVE X%,100
150 DRAW X%,Y%
160 NEXT X%
```

**Listing 3. Using X% and Y% to draw graph**

```
  10 REM Hints & Tips - Listing 4
  20 REM by Martin Phillips
  30 REM for M/C or BBC B/B+ with
 GXR
  40 REM (c) Acorn User January 1
987
  50 :
  60 MODE 1
  70 VDU 23,2,&F,&F,&F,&F,&F,&F,&
 F0,&F
  80 VDU 5
  90 GCOL 32,128
 100 CLG
 110 VDU 24,32;32;1248;992;
 120 GCOL 16,128
 130 CLG
 140 GCOL 0,0
 150 VDU 30
 160 PRINT"HELLO"
```

**Listing 4. Draws a stripey screen**

```
  10 REM Hints & Tips - Listing 5
  20 REM by Martin Phillips
  30 REM for M/C or BBC B/B+ with
 GXR
  40 REM (c) Acorn User January 1
987
  50 :
  60 N%=0
  70 MODE 1
  80 VDU 23,1,0;0;0;0;
  90 REPEAT
 100 N%=N%+1
 110 A%=RND(800):B%=RND(800)
 120 VDU24,A%;B%;(A%+RND(800)) MO
D 1280;(B%+RND(800))MOD1024;
 130 GCOL 16+RND(64),128
 140 CLG
 150 I%=INKEY(10)
 160 IF N% MOD 50=0 THEN VDU 19,R
ND(4),RND(7),0,0,0
 170 UNTIL FALSE
```

**Listing 5. Draws random rectangles**

Please note that these Hints and Tips listings appear on the January *Acorn User* listings disc and cassette.

# FIRST BYTE

## STACKING THE BYTES

**This month subroutine commands are explained and also how to stack the memory**

*Tessie Revivis*

In BBC Basic and other versions of Basic, there usually is a program structure which allows segments of program lines to be repeatedly called. BBC Basic is particularly well endowed in this area, being supplied with procedures and functions which Joe Telford covered in the last issue. These two structures are called high level structures, because you can call them by name.

At a lower level we have the 'Gosub . . . Return' structure. Here the Gosub command is less intelligent and a line number must be specified to inform the program of the destination. The end of the Gosub, which stands for 'go to subroutine', is marked with the Return command. In Gosub . . . Return terms, a routine to wait for any keypress would be written as:

```
1000 PRINT "Press any key";
1010 key=GET
1020 RETURN
```

and would be called with a line such as:

```
GOSUB 1000
```

This method is less elegant because it means you have to keep a mental note of where line numbers occur.

In assembly language the Gosub . . . Return commands have direct counterparts in the JSR and RTS mnemonics. JSR stands for, 'Jump subroutine' (or Jump Save Return) and RTS, 'Return from subroutine'. Like its Basic counterpart, JSR takes a number as its destination. The number in this case is an address not a line. The Basic assembler spoils us though, removing the task of having to hand calculate JSR addresses by allowing the use of labels. In assembler terms a label is rather like a variable preceeded by a full stop. The full stop is only used when marking the position of the label, it is not used when used as the destination of the JSR, as the above program illustrates. The program starts off by jumping to the subroutine called 'anykey' (line 70), which exists at line 120, 130 and 140. Note how the label on line 120 is preceeded by full stop. The subroutine performs a similar function to our Gosub . . .Return program segment above. The routine also uses two other JSR commands, these are followed by the standard JSR address to the micro's operating system, which performs the following functions.

```
10 REM Subroutine Demo
20 :
30 DIM code% 50
40 FOR pass=0 TO 3 STEP 3
50 P%=code%
60 [OPT pass
70 JSR anykey
80 LDA #7
90 JSR &FFEE
100 RTS
110 :
120 .anykey
130 JSR &FFE0
140 RTS
150 ]
160 NEXT
170 CALL code%
```

**A simple subroutine demonstration**

&FFE0 : wait for the key press

&FFEE : print ASCII code in the accumulator

The &FFE0 address effectively simulates a 'GET' command and is in fact the address Basic calls upon when it executes a GET.

When the assembly program is run, the Basic assembler makes a note of the addresses of all labels. If a JSR is encountered, are the addresses allocated to the label is placed after the JSR instruction. Figure 1 illustrates a typical output when the above program is run. The addresses to the left will vary depending on page setting. The relevant lines are eight and two and in line eight, the address for the label 'anykey' has been assigned and is &0EC2. In line two, the address has been assembled low byte first, the three numbers are 20, C2 and 0E which break down into:

&20: opcode for JSR
&C2: low byte of &0EC2
&0E: high byte of &0EC2

In a similar manner the JSR addresses assembled in lines four and nine of figure 1 also have had the destination addresses assembled. Type:

CALL code%

press any key to hear the bleep.

So much for defining where a destination address is, but how does the RTS instruction know where to return to? The answer is the stack. The stack is an area of memory within the computer which is used to store or stack up addresses. The most important feature to remember is it is a 'LIFO' structure. That bit of jargon simply stands for 'Last In First Out', in other words, the last item in must always be the first out.

```
 1 0EB9               OPT pass
 2 0EB9 20 C2 0E      JSR anykey
 3 0EBC A9 07         LDA £7
 4 0EBE 20 EE FF      JSR &FFEE
 5 0EC1 60
 6 0EC2
 7 0EC2
 8 0EC2               .anykey
 9 0EC2 20 E0 FF      JSR &FFE0
10 0EC5 60            RTS
```

**Figure 1. Output from the subroutine program**

Many analogies can be drawn to explain this, the most popular is pile of plates. A pile of plates can be stacked up, each representing a byte of data. As each plate is added the stack grows and the last plate on the stack must always be the first to be removed. It is possible to take a plate from within the stack but the result will be a pile of plates crashing to the ground.

Physically, the stack exists as a series of memory locations in your micro. It is stored in page &01 of the memory map which encompasses memory locations &1FF down to &100. The bottom 32 bytes are used to store the computer error messages. You will have noticed I refered to the memory locations in the reverse order ie, highest first, this is because the stack is

stored upside down! It grows down in memory. For example, if the stack was clear and you placed a byte onto it, it would be stored at address &1FF. If you placed another byte on the stack it would be deposited in location &1FE and so on. Using jargon the action of placing a byte on the stack is called 'pushing' and the action of removing a byte is aptly called 'pulling'.

But how do we keep track of where bytes are to be stored when they are pushed, and erase them when they are pulled from the stack? The answer is we don't! A special register exists within the processor chip which always points to the next free location on the stack. This register, which is incremented or decremented automatically by the microprocessor chip, is called the 'Stack Pointer'. Figure 2 shows how the stack and stack pointer would look after having six bytes pushed on to it.

Figure 3 shows the situation when two bytes have been pulled from the same stack. The stack pointer has been incremented by two and now points to &1FB. Note that the stack contents have not changed the bytes in &1FB and &1FA, so bytes are not erased from the stack but simply overwritten.

The stack pointer itself is only a single byte wide. Hence, it can only contain values in the range &00 to &FF, so it can't hold the full address of the next free stack location. However, the stack is always held in locations &1FF down, so we can forget about the preceeding &1. In reality, the pointer is electronically wired into the area of memory which forms the stack – this is a hardware connection and so the stack is often called the hardware stack.

Another special register exists within the processor, this is the program counter and it is a two byte register. It always contains the start address of the next instruction to be executed. Whenever a JSR instruction is executed the processor takes the address in the program counter and pushes it to the top of the stack. The address specified after the JSR instruction is then taken and placed into the program counter and the program now runs from this new point.

There is nothing to stop subroutines calling subroutines. It is also possible for subroutines to call themselves to do repetitive tasks, a technique called recursion.

There are several instructions which allow us to use the stack from within

| | | |
|---|---|---|
| &1FF | &23 | |
| &1FE | &OE | |
| &1FD | &FF | |
| &1FC | &EE | |
| &1FB | &30 | |
| &1FA | &40 | |
| &1F9 | | <—Stack Pointer=&1F9 |

**Figure 2. The stack with six bytes**

machine code programs to act as a temporary store. Because of the way the stack is used by the 6502, it is vital that when calls are made to subroutines, the stack must be clear of any data before the RTS instruction is performed. Figure 4 shows why this is so. Here the stack contains three bytes of data. The bytes at &1FF and &1FE are return addresses (&20F3) pushed there by the processor when a subroutine was called. The same program then deposited the &FF byte on the stack. Suppose now the RTS instruction was encountered, what would happen? The program would crash because it would pull the &FF and &20 bytes off the stack and deposit them into the program counter and try to run the program from that address. What should happen is the byte must be removed from the stack for the RTS to work. So what are the commands that allow us to use the stack? Here they are:

| | | |
|---|---|---|
| &1FF | &23 | |
| &1FE | &0E | |
| &1FD | &FF | |
| &1FC | &EE | |
| &1FB | &30 | <— Stack Pointer=&1FB |
| &1FA | &40 | |
| &1F9 | | |

**Figure 3. Two bytes pulled**

| | | |
|---|---|---|
| &1FF | &F3 | |
| &1FE | &20 | |
| &1FD | &FF | |
| &1FC | xx | <—Stack Pointer=&1FC |

**Figure 4. Return addresses**

PHA : push accumulator onto the stack
PLA : pull accumulator from stack

These two instructions simply allow the contents of the accumulator to be pushed onto the stack and then pulled from the stack and back into the accumulator. Each PHA must have a balancing PLA.

On a standard 6502 based micro the two index registers cannot be pushed and pulled directly on to the stack, they must first be moved across into the accumulator using the following instructions:

TYA : transfer Y to accumulator
TXA : transfer X to accumulator
TAY : transfer accumulator to Y

```
 10 REM Stack Demo
 20 DIM code% 50
 30 P%=code%
 40 [
 50 LDA #ASC"="
 60 JSR &FFEE
 70 JSR &FFE0
 80 PHA
 90 LDA #ASC"="
100 JSR &FFEE
110 JSR &FFE0
120 PHA
130 LDA #ASC"="
140 JSR &FFEE
150 JSR &FFE0
160 PHA
170 :
180 PLA
190 JSR &FFEE
200 PLA
210 JSR &FFEE
220 PLA
230 JSR &FFEE
240 RTS
250 ]
260 CALL code%
```

**Clearing the stack before an RTS instruction**

TAX : transfer accumulator to X

The register into which data is being moved will have its contents over-written by the incoming data. To push any register on to the stack, two instructions must be performed eg, to push the X register use: TXA PHA and to pull it use: PLA TAX On the Master series computers, including the Compact, there is an enhanced version of the 6502 chip which contains new instructions for direct pushing and pulling of the registers, the commands are as follows:

PHX : push X
PHY : push Y
PLX : pull X
PLY : pull Y

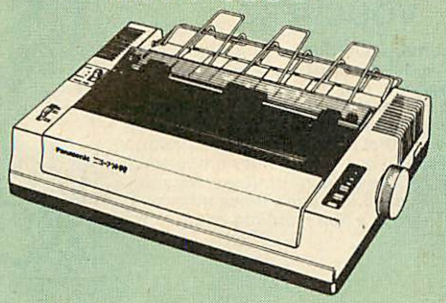
The program above reads the keyboard for three keypresses, pushing the ASCII codes of the letters on the stack before printing them to the screen.

Lines 50 to 80 are repeated three times and work like this: print the '=' prompt, read the keyboard and push accumulator which contains the ASCII code of the key pressed. Lines 180 and 190 also repeat three times and pull top of stack into the accumulator and print the contents.

Run the program and press the A, S and D keys. These are then printed in reverse order. The reason is because of the stack being a LIFO structure!

There are many other ways in which the stack data can be manipulated as you will discover when we return to the subject in a future First Byte.

# Panasonic KX-P1080



**from the prodigious Japanese Stable of Panasonic comes this fabulous new NLQ Dot Matrix Printer**

Available NOW at a superbly realistic price, the KX-P1080 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy 100 cps of clear Draft text backs up the crisp 20 cps Near Letter Quality text mode, with upto 40 superbly useful downloadable characters. A delightful range of assorted character widths is efficiently supported, with sizes ranging from a broad 5 cpi to petite 17 cpi, EVEN in NLQ mode. Some of the extensive support for serious use includes specialised functions to perform justification, centering and even left and right ranging. Proportional spacing permit even greater freedom when it comes to advanced use. Not only is the full Epson RX compatible control code set implemented, but extra codes have also been added to cater for the NLQ options, etc.

A full 96 ASCII character set is supported, with an extended set of 32 international characters A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

The draft text is implemented with a 9 × 9 matrix, with Near Letter Quality effected by means of an 18 × 18 matrix.

***FREE, £40 worth of hardware and software with every KX-P1080 printer purchased this month, 1000 sheets of fanfold paper, printer cable for a BBC micro and our sophisticated Dump Out 3 screen dump ROM.***

Introductory Price: **£155** (carr. £7)

## Panasonic KX-P3131 Daisy-Wheel Printer

A few months ago, we introduced the KX-P1080 to our large and discerning customer base. As a result of the enthusiastic and overwhelming reaction to this versatile dot matrix printer (see above for details), we are now extremely pleased to be able to bring you details of the fabulous KX-P3131 Daisywheel Printer, also from Panasonic. The KX-P3131 printer is the ideal printer for the home user wishing to produce clear, immaculate letters or reports.

Ideally suited to the pocket of the home user, costing not much more than a pair of disc drives, this daisywheel printer delivers flawless text at 10, 12 or 15 characters per inch. It also supports proportional print mode.

Printing at a respectable 17 characters per second, the KX-P3131 features a capacious 6 kilobytes printer buffer to swallow most printing requirements with ease. For the more demanding user, there is a 32 kilobytes printer buffer option available. Taking paper up to 13.5" wide, the KX-P3131 prints with bidirectional logic seeking, ensuring the minumum time to print your text.

Only **£225** (carr. £7)

| | |
|---|---|
| Single Sheet Feeder | £195 |
| Tractor Feed | £90 |




We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

**MICROVITEC 14"**

- 1431 – Medium resolution as used on the BBC television computer programme **£172**
- 1451 – High resolution, suitable for word processing in mode 0 **£225**
- 1441 – High res, exceeds the capabilities of the BBC micro **£365**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£255**
- **TOUCHTEC** Touch Screen Pack **£250**
- Dust Cover for Microvitecs **£5.50**

**KAGA-TAXAN 12"**

- KAGA KX1201G Hi-res Green Monitor **£90**
- KAGA KX1202G Long persistence Hi-Res Green Monitor **£95**
- KAGA KX1203A Ultra-Hi-Res Amber Monitor **£95**
- **Kaga Super Vision 3,** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue **£320**
- KAGA Vision 2 Hi-res RGB Colour monitor. Ideal for Wordprocessing **£260**

## ZENITH

"Test Bureau Recommended for use in Education"

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith Micro Systems.)

| | |
|---|---|
| Green (New Design) Hi-res | £69 |
| Amber (New Design) Hi-res | £76 |

**LEADS**

| | |
|---|---|
| **BNC Lead for Zenith or Philips** | £3 |
| Skart Monitor Lead | £5 |
| RGB lead for KAGA | £3 |

**N.B.** carriage on Monitors **£7** (securicor)

## SWIVEL BASES

**for Video Monitors**

By placing your monitor on one of our superb swivel bases, you gain the freedom to adjust the monitor viewing angle to suit your needs. By doing this, you alleviate eye strain and reduce back stress.

for 12" Monitors **£10** (carr. £2.50)
for 14" Monitors **£14** (carr. £2.50)

## TED

**The Teletext Editor Package for serious users**

TED is the brand new package from Watford Electronics for the editing and creation of teletext (Mode 7) screens and displays. TED is ideal for anyone wanting to create their own Mode 7 pictures (such as game title pages), designing animated displays for shop windows, exhibitions, classrooms, etc. TED is also probably the most powerful Prestel screen editor you will ever come across.

Supplied on a special 32k package, full facilities are providing for manipulating the screen, including easy to use pixel manipulation; line, column and block buffering and copying; left and right margins; large text in a variety of different fonts (contained within the ROM device); various borders and effects templates (contained within the ROM device); line and column insertion and deletion; easy to use graphics line drawing. Those are some of the features of editor itself. In addition to this, TED contains routines for taking a number of Teletext screens and creating them into an animated sequence, with user selectable display times, repeats on a group of shows, various entry methods (how the picture is put onto the screen), routing selection (both predefined and keyboard specific), chaining of other shows, etc. Scrolls treat the Teletext sequence as a very long page with a window onto it. Supplied complete with a comprehensive manual. There are many more facilities not mentioned here, so write in for a comprehensive leaflet; you'll wonder how you managed without TED.

**Price: £35**

## VIEW PRINTER DRIVER ROM

**(Professional facilities for demanding users)**

View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

**Price: Only £33**

## THE EUREKA CARD

**(The Unique RAM Expansion System)**

The Eureka Card is Watford's latest and most sophisticated RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!

Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sofisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.

The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

Introductory price: Only **£89** (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degredation does occur with filing system access. Eureka cannot be used at the same time as a second

Continued →

# Mark II Light Pen

You no longer have to fiddle with the brilliance control or work in the shade as this NEW Mark II Light Pen is totally insensitive to local lighting conditions. It only operates on high frequency light from the TV or Monitor. The red LED Indicator on the Mk II pen, lights up when valid video data is available. Your program can have access to this signal allowing computer verification of target for high res drawing. The conveniently located switch on the pen body allows the computer to ignore any stray signals. Supplied complete with the sophisticated PEN-PAL Software on Cassette or Disc. Please specify.

**Special Offer Price: £15**

## THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED (BOOK)

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

## WATFORD TOPS THE DFS CHART

*Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.*
*In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price".*
*(Please write in for comprehensive details.)*

## WATFORD's & ACORN's SINGLE DENSITY DFS

*Watford's popular and widely acclaimed DFS has now been available for four years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade.* ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).***

**PRICES**

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£58**
- *Acorn's 0.90 DFS Kit complete* **£52**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
  *(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs).*
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM comes a special label with our LOGO and serial number.*

## WATFORD's DOUBLE DENSITY DFS INTERFACE

*The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.*

*The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.*

**PRICES**

- *Complete DDFS Kit incl. fitting instructions* **£46**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£29**

## CHRISTMAS GIFT VOUCHERS

Following numerous requests from you the customers, we have at last introduced our GIFT VOUCHER service. The Vouchers are available in £5) £10 & £15 demominations and are an ideal answer when faced with that problem of what to give for that special Birthday-Christmas gift. Simply send your credit card number or your cheque for the amount of Vouchers you require and we shall send you these attractive Vouchers. (There is a 50p handling charge on any amount.)

## MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive[ What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin[ What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

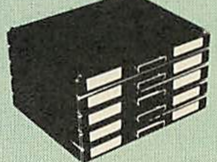
**£5.95** (Book No VAT)

## DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

**£4**

## STAK-PAK



The unique computer program filing and storage system. Made of tough black plastic, these compact drawer sections hold two cassettes each and lock together vertically to form miniature cabinets of any height. Each drawer section has two C12 Data Cassettes with labels plus external index card.

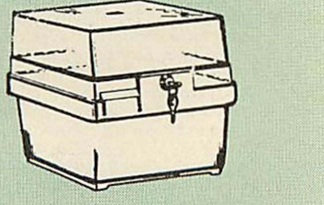
Five twin Packs incl.
10 Cassettes Only: **£5**

## FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

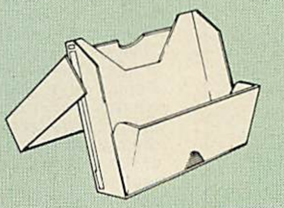
**£8**

## LOCKABLE DISC STORAGE UNITS



Strong plastic case that affords real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- M35 - holds upto 50 discs **£8**
- M85 – holds upto 95 discs **£10**



## PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£2.00**

## DUST COVERS (For our Disc Drives)

*Single CLS (without PSU)* ***£3.20*** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

## Quality Disc Drives from Watford

*To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.*

*The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".*

*The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our drives are of Japanese manufacture. All our 80 track drives are already fitted with a 40-80 select switch.*

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

*Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.*

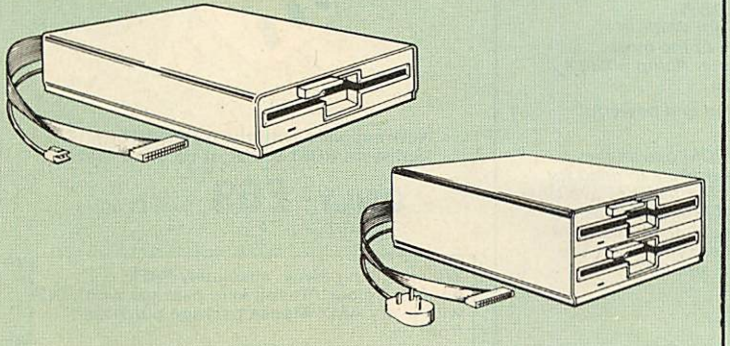
*If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.*

*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate( extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives in Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below for single drives is for a single drive in a standard single case. Single drive in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!*

*When using a BBC Micro, most people find themselves short of space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 10th page of our advert for the Plinths).*

*P.S. All our 5¼" Disc Drives are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.*

**COMPACT DISC DRIVE CABLE**
**Single £9 Twin £12**



| Capacity | Drives without P.S.U. | | Drives with P.S.U. | |
|---|---|---|---|---|
| | Single | Twin | Single | Twin |
| 200K (360K) | CLS 200 £95 | | CS 200 £108 | |
| 400K (720K) | CLS400S £96 | CLD 400 £180 | CS 400S £109 | CD400 £200 |
| 800K (1.44M) | | CLD 800S £183 | | CD 800S £204 |

● TWIN Disc Drive Case, complete with Power Supply & Cables **£39**
**Securicor carriage on Disc Drives £5 to £6**

*Prefix **C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

*Suffix **S** = 40-80 Switchable*

*e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40-80 track).*

# 3M – DISKETTES

*Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.*

- *10 × 5¼" S/S D/D 40 Track Diskettes* ***£10***
- *10 × 5¼" D/S D/D 40 Track Diskettes* ***£12***
- *10 × 5¼" S/S D/D 80 Track Diskettes* ***£17***
- *10 × 5¼" D/S D/D 80 Track Diskettes* ***£17***
- *Hi-Density 1.6M D/S D/D for IBM* ***£32***

- *10 × 3½" S/S D/D 40/80 track Discs* ***£20***
- *10 × 3½" D/D D/D 40/80 track Discs* ***£26***

## TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

**DON'T SETTLE FOR LESS, BUY THE BEST**

- ***10 × M3 3½" D/S D/D 80 Track Discs £20***
- *10 × **M4** 5¼" S/S D/D 40 Track Discs **£9***
- *10 × **M5** 5¼" D/S D/D 40 Track Discs **£11***
- *10 × **M7** 5¼" D/S D/D 80 Track Discs **£14***
- *3" Double Sided Discs **£3** each*

## Special BULK OFFER on 5¼" DISCS

(Supplied packed in plastic storage Units)
(Lifetime warranty on Discs)

**BULK PACK DISCS in lots of 100**

| Type | S-S 80T | D-S 80T |
|---|---|---|
| ● Without Sleeves | £49 | £74 |
| ● With Sleeves | £50 | £75 |

## ACORN WINCHESTER DRIVES

Suitable for direct connection, via the 1MHz bus, to any BBC running ADFS. These Acorn Winchester disc drives are fast and extremely reliable. Each Winchester comes complete with the Level III Econet File Server software.

10 Megabytes **£1050; 30 Megabytes £1549**

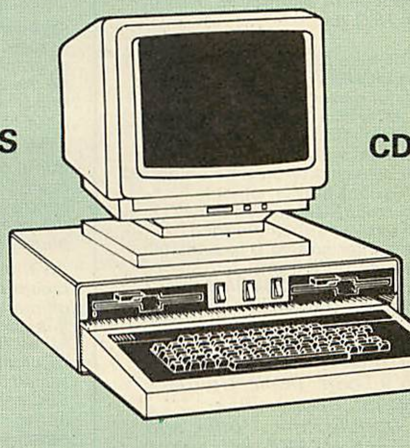
## WATFORD's WINCHESTER DRIVES

- 20 Megabytes with ADFS **£635**
- 40 Megabytes with ADFS **£999**

## WINCHESTER WORKSTATION

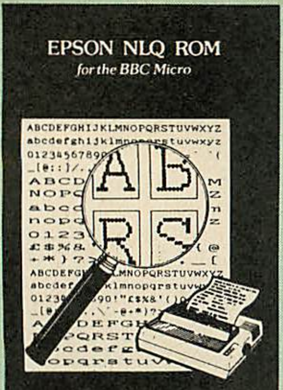
20 Megabyte Winchester, plus a Tape Streamer and a 400K Floppy Drive all housed in a plinth with cooling fan **£1499**

**CDP 800S** **CDPM 800S**



**Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.**

**CDP 800S for BBC Micro £210**
**CDPM 800S for Master £225**
*(Securicor Carr. £7)*




Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:
- Simply type *NLQ80-100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80) ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set) Standard 'pica size') Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

**Only: £25**

### VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

**£7.00**
(Hi-View compatible)

## THE NLQ DESIGNER

**(The First & still the Best)**

KAGA KP810-910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on.
Downloadable Fonts require 6264 RAM chip fitted. Now BBC Master compatible.

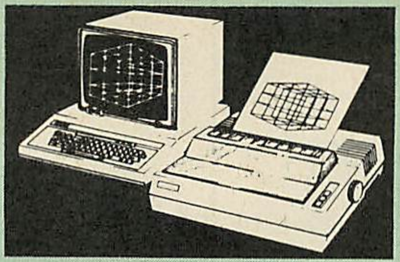
*A 40 or 80 track (please specify) FONT Disc containing 9 Fonts, (Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print, Gothic and Greek is now supplied FREE with every package.*

(P.S. This ROM is not suitable for Epson printers.)

- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

(Write in for further details).

## DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines(
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:
- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
*"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".*

*"an extremely sophisticated and powerful dump utility".*

*"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".*

*The Micro User Feb. 1985.*
*"Well, here is that winner"!*

*"provides) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)*

*"The versatility of ßGIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".*

*"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".*

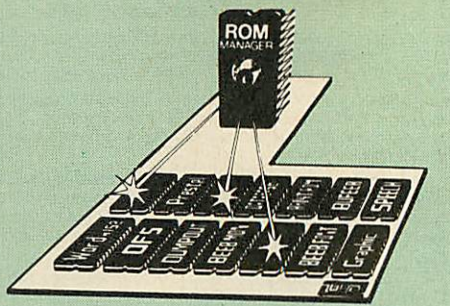
*Designed for use with the following printers:*

*GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Mannesman Tally etc.*

Price including comprehensive manual

**£25**

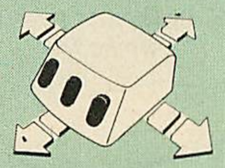
## ROM MANAGER




Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)
Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.
Many more facilities available.

**SPECIAL OFFER £18**

# *THE AMX MOUSE*



**Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.**

**ONLY: £63** (carr £1.50)

We are giving away, absolutely **FREE**, our popular Colour Art software package worth **£15** with every AMX Mouse package purchased from us.

| | |
|---|---|
| AMX DESK Package | **£19.00** |
| AMX UTILITY Package | **£11.00** |
| AMX SUPERART Package | **£42** |
| AMX PAGE-MAKER Pack Best desk-top publishing software. Works with keyboard, joystick and AMX Mouse | **£34** |
| AMX 3D ZICON Disc | **£19** |
| AMX Database Disc | **£19** |
| AMX XAM Educational | **£19** |
| AMX MAX( A gem of desktop (ROM) | **£17** |

## RB2 MARCONI TRACKER BALL

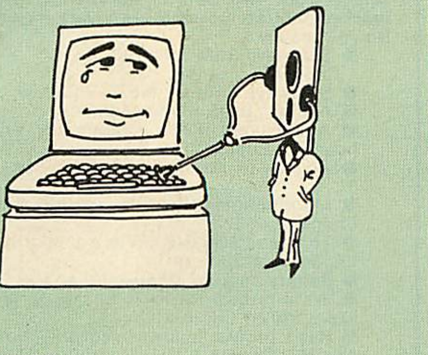
This popular unit is supplied complete with software.

Price: **£50**

## FLEET STREET EDITOR

Software pack **£35**

## DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

**Only £20.00**

## BBC Publication's Popular Educational Software

| | |
|---|---|
| Maths with a Story 1 (Cassette)<br>4 primary level maths programs | £10.95 |
| Maths with a Story 2 (Cassette)<br>4 further maths programs | £10.95 |
| Picture Craft (Disc)<br>6 - 14 age group. Pack consists of flexible geometrical design & colouring programs. | £19.95 |
| WAVES: Science Topics (Disc)<br>CSC O Level Physics program. | £14.95 |
| RELATIONSHIP: Science (Disc)<br>O Level Biology program. | £14.95 |
| BONDING: Science (Disc)<br>O Level Chemistry program. | £14.95 |
| ELECTROMAGNATIC SPECTRUM (8 Discs)<br>O Level program. | £14.95 |
| ELECTRONICS IN ACTION (Disc)<br>O Level program | £14.95 |
| NEWTON & THE SPACE SHUTTLE (Disc)<br>O Level program. | £20 |
| ECOLOGY (Disc)<br>O Level program. | £20 |
| POLYMERS (Disc)<br>O Level program. | £20 |
| Clasification & Periodic Table<br>O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. | £20 |
| FOOD & POPULATION (Disc)<br>O Level program. | £20 |
| MICROTECHNOLOGY (Cassette)<br>O Level program. | £6.95 |
| A VOUS LA FRANCE (2 Cassettes)<br>A French language home study aid. | £17 |
| DEUTSCH DIREKT! (Disc & Audio Cassette) | £20 |

NEW LAUNCH

## THE BBC + MICRO ROM EXPANSION BOARD

Specially designed for all BBC Plus users, this board sits in an external box, and will accept either 10 off 16k EPROMs, OR 10 off 32k EPROMs.

With the 32k EPROMs, only 5 can be 'online' at once (that's all the B+ can address, as each chip 'holds' two normal sockets worth), but you can swap between the two banks if necessary. With the 16k EPROMs, you can obviously address them all at once. An extra card can be added to permit 2 banks of 10 EPROMs to be used (again with only one bank available at once).

The ROM box, which has its own mains power supply, and connects to the BBC Plus via a specially designed card (which is a buffered card for your peace of mind) permits easy access to the EPROMs via the hinged lid. NO soldering is required for this board.

## ROMAS

### THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

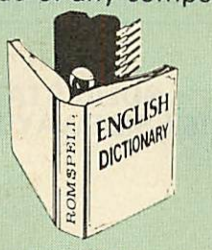
6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

A give away at . . . **Only £29**

Please specify 40 or 80 track disc when ordering.

## ROM-SPELL

"way ahead of any competition"




ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP-M and MSDOS, namely Spellstar and has a speed-performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Compatible with: View, Wordwise & Wordwise +.

Don't settle for less, Buy the best.

**£25**

(Not compatible with 1770 DFS)
(Please state 40 or 80 track disc)

## BBC MICRO BUSINESS/ WORD/PROCESSING PACKAGE

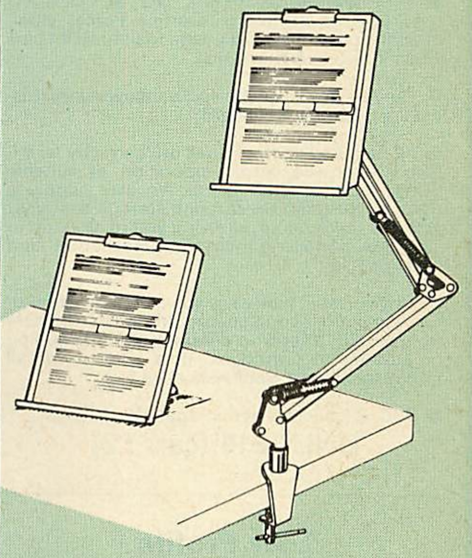
A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in at our retail shop to discuss your particular requirement and a demonstration.

**EXAMPLE PACKAGE**

BBC Master 128K Micro, View wordprocessor, Viewsheet, Basic Editor, Terminal Emulator, Twin 800K 40-80 track double sided Disc Drives, Zenith Hi-Res green monitor, Panasonic KX-P3131 professional quality Daisy Wheel printer, Gemini Database, Spreadsheet, Beebplot Graphics, Cashbook, Final Accounts, Mailist, Easiledger, Invoice & Statements, and Stock Control packages on disc with manuals.

**Only £899**

## COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.

The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.

Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder#

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

All prices in this advert are exclusive of VAT.

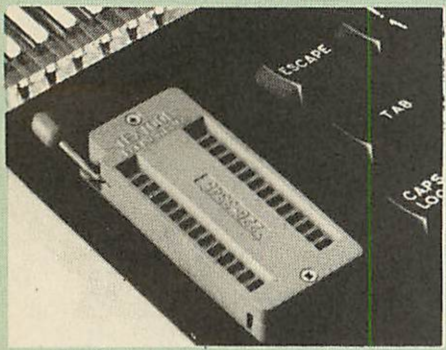
## REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

**£13** (40 or 80 track)

Continued →

## SIDEWAYS ZIF SOCKET




Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the Keyboard.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

● BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

## Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

| | |
|---|---|
| Complete System | **£11** |
| Spare Cartridges | **£2.50** |
| Spare Rack | **£1.50** |

## 16K Sideways RAM Modules

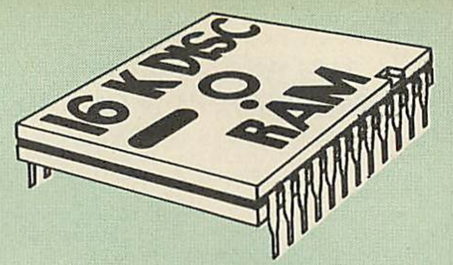
This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are(

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

### Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**



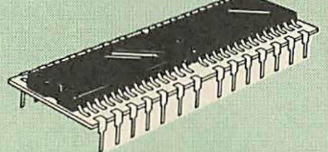

This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected.
The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM.
Features available are:

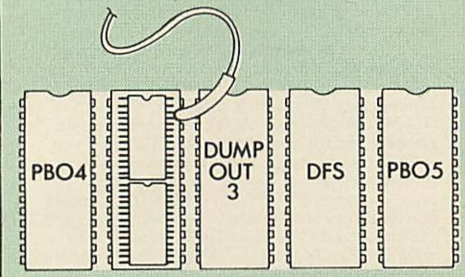
- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

**New Low Price: £32** (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

## SOLID STATE 16K SIDEWAYS RAM






This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. ***Compatible with BBC B Plus.*** Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)

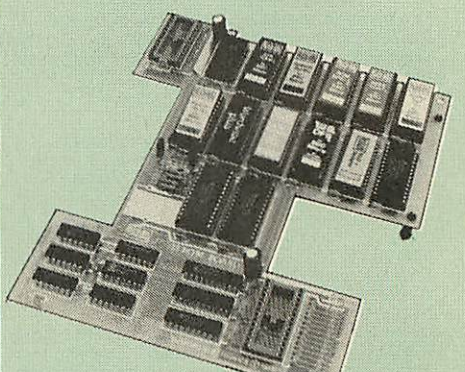
Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

**Do you find the 16K Sideways RAM Units confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.**
Do you require:

- Sideways RAM for a BBC B+ Choose 1, 2 or 3.
- Sideways RAM for the B+? Choose 3.
- A small, basic module? Choose 3.
- A sideways RAM module for a ROM board? Choose 1 or 3.
- An easy to use utilities disc[ Choose 1, 2 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose (1) or 2.
- Write protect for RAM (makes ROM look like RAM)? Choose (1) or 2.
- Read protect (allows recovery from crashes)? Choose 1.

Key:
1) 16k Sideways RAM Module
2) 16k Disc RAM
3) Solid State 16k Sideways RAM

## SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

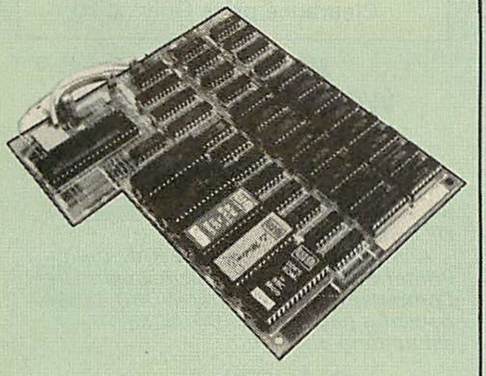
Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

**Price: Only £32**
Battery backup fitted **£36**
(carriage £2)

# Watford ROM/RAM CARD

***A must for all serious users***



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

***INTRODUCTORY PRICES:***

- ROM/RAM card with 32k dynamic RAM ...... **£39**
- ROM/RAM card with 64k dynamic RAM ...... **£52**
- ROM/RAM card with a massive 128k dynamic RAM ...... **£80**

(carriage on ROM-RAM Card £3)

***OPTIONAL EXTRAS:***

- *16k plug-in Static RAM kit* ...... ***£6***
- *16k Dynamic RAM for Upgrade* ...... ***£7.50***
- *Battery backup* ...... ***£3***
- *Read and Write protect switches* ...... ***£2 each***

*Complete ROM-RAM board (all options installed)* ...... ***£89***

# *Le Modem*



## The MODEM from Watford

*At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.*

*The features that make Le MODEM such good value are:*

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple *COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *FREE Membership to MicroLink.*
- *BT Approval applied for.*

*(When ordering, please specify the version required, (BBC or Master)*

## SPECIAL OFFER

Price: **£74**
(carr £3)

PROHIBITED from direct or indirect connection to any telecommunication system run by British Telecommunications. Action may be taken against anyone so connecting this apparatus.

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

# Nightingale Modem

SPECIAL PRICE to our Customers

**£99**

(Price includes: Nightingale Modem, Commstar ROM pack, Cables & Comprehensive manual)

| | |
|---|---|
| Nightingale Modem without software | **Only £87** |
| COMMSTAR ROM package only (P&P on modem £2.00) | **£29** |
| Auto Dial-Auto Answer Board (non BABT) | **£48** |
| Auto Dial Utilities Disc | **£9.50** |
| OBBS Bulletin Software | **£20.00** |

# APOLLO

## The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- FREE membership to MicroLink.

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Special Launch Price: **£75**
**(Carr £3)**
(Write in for full specification)

## BT TELEPHONE CONNECTORS

| | |
|---|---|
| LJU 1/4A Mini Line Master | **£4.50** |
| LJU 1/6A Mini Line Slave | **£3.00** |
| LJU 2/4A Line Master | **£4.00** |
| LJU 2/6A Line Slave | **£2.50** |
| LJU 3/4A Flush Master | **£3.95** |
| LJU 3/6A Flush Slave | **£2.75** |
| LJU 10/3A Dual Splitter | **£5.50** |
| 4 Way BT Plug | **£0.75** |

## Versatile **BEEB SPEECH SYNTHESISER** Unit




The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

**SPECIAL PRICE £32** (carr £2)

**Continued** →

## COMPUTER CONCEPT'S ROMS

| | |
|---|---|
| ACCELERATOR | £48 |
| CARETAKER Basic Utility | £25 |
| Graphics ROM | £23 |
| TERMI | £27 |
| COMMUNICATOR | £49 |
| SPEECH ROM | £26 |
| Printmaster | £24 |

**Wordwise** £25

**Wordwise plus**

**WORDWISE PLUS**
**£38**

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

## Word-Aid

### The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

**HI-WORDWISE-PLUS**

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

**£5**

**Inter SHEET £38**

**INTER-CHART** ONLY: £26

**Inter-WORD**

**Only: £44**

Special Discount price for the existing Wordwise Plus owners. Simply quote your reg. number and pay.

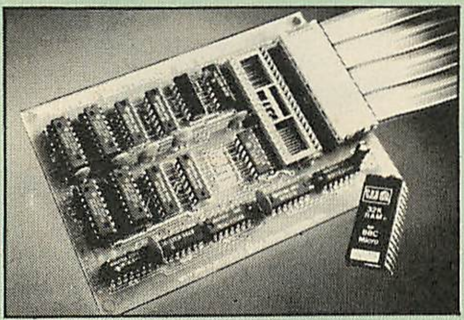
Only: **£39**

All Prices Exclusive of VAT

# *32K*

# SHADOW RAM-Printer Buffer

## Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B¿ or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Ensure COMPATIBILITY with a vast range of hardware (including our ROM board, the ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, Music 500's AMPLE). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable and has the power consumption of a couple of ROMs!
- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages, and a comprehensive manual is supplied free.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

**Only( £59** (carr £2)

(Price includes a comprehensive manual and the ROM)

## SPECIAL OFFER

**Acorn's Speech Synthesiser Package**

Complete with manual in its original packaging

Clearance price Only: **£16**

## *INCREDIBLE WORD PROCESSING DEAL ! ! !*

*Watford Electronics, already renowned for quality products at discount prices, are offering, the truly spectacular BARGAIN OF THE YEAR!*

*A Watford's 32K Shadow RAM Card – Printer Buffer and the much sought after, Computer Concepts' Inter-WORD, (a very powerful package) All this at an astounding price of:*

***Only £79*** (carr £2)

## DATAGEM

Gemini's popular Database package
**Only: £34**

## VIEW

VIEW WORDPROCESSOR 2.1 **£37**

### VIEW 3.0 ROM

Price: Only **£56**

### HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

**£36**

| | |
|---|---|
| **VIEWSHEET (Acornsoft)** | **£37** |
| **VIEWSTORE** | **£37** |
| **VIEWSPELL with 80 track disc** | **£29** |
| **VIEWPLOT Disc** | **£22** |
| **VIEW-INDEX** | **£12** |

**Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP**

**Only £10**

**VIEW DRIVERS FOR JUKI & BROTHER HR15 PRINTERS**

**Only £10**

**VIEW-VIEW SHEET PRINTER DRIVER for SILVER REED**
**(Officially approved by Silver Reed)**

**Only: £10**

**MINI OFFICE II (tape)** **£14.50**

# ARIES CORNER

## Aries B-32 Shadow RAM Card

18 months of intensive research and development have produced a worthy successor to the widely acclaimed Aries-B20: the revolutionary Aries-B32. This 'second generation' expansion board features 32k of RAM and a 16k ROM socket.

Like the BBC B+, the B32 provides 20k of *shadow screen* RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: B-32 **£80** (carr. £2)

## Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries B-20 and the Aries B-32. For the business user or educationalist, the compact and secure internal fitting is ideal, with the ROM board tucked neatly inside the lid where it will not cause overheating problems. The serious software developer and the hobbyist may prefer to mount the board externally, giving instant access to the sockets for experimental purposes. A zero-insertion force (ZIF) socket may be fitted to the board to enhance this mode of operation.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable 'mother board' which carries the extension ROM sockets and a small 'base board' on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have an B32 or B20, a small adaptor module (the Aries B-12C) is available at a nominal cost. The 6264 static RAM chips used to provide the sideways RAM are advertised elsewhere in our advert.

Price:
Aries B-12 **£40.** Aries B-12C **£5**

## GRAPH PAD 2

Supplied complete with Software **£60** (Carr. £3)

## ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

Aries B-488 Unit: **£238** (Carr £3)

## THE ARIES RANGE HARDWARE REQUIREMENTS

Aries B-32 & BBC B, MOS 1.20, hardware plugs into CPU socket.
Aries B-12 & BBC B, MOS 1.20, hardware plugs into all four sideways ROM sockets and connects to the B32 or the B20. The adaptor Aries B-12C module is necessary where these are not fitted.
Aries B-488 BBC B, MOS 1.20, Hardware plugs into 1MHz Bus.

## BEEBMON

The most powerful machine code monitor for the BBC Micro **£24.**

## DISASSEMBLER ROM

ONLY **£16**

## THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

**CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234-33383**

النور

## *ARABIC ROM* for the BBC Micro

The ALNÓOR ARABIC ROM converts your BBC into a bilingual computer. New keytops provide both English and Arabic symbols. Two sets of Arabic symbols are provided for use in either context sensitive or insensitive operation.

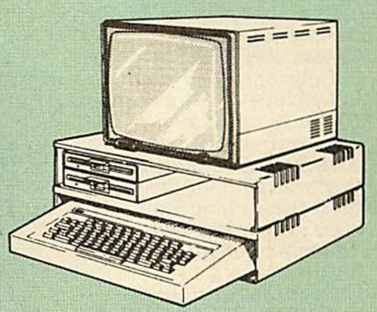
20, 40 and 80 column operation. Compatible with ASMO (449). English-Arabic printer interface software. Numeric entry from either left or right of number. Communications software to send or receive 7 or 8 bit data.

Different shapes of Vowels (e.g. Shadda, Fatha, etc). Different shapes of Hamza. Full English and Arabic character sets with all special characters.

**£85**

(Price includes Alnoor ROM, Operating Manuals & a full set of Arabic/English Keytops)

## PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

| | |
|---|---|
| SINGLE BBC PLINTH | **£11** (carr. £1.50) |
| DOUBLE BBC PLINTH | **£20** (carr. £2.00) |
| PRINTER PLINTH | **£10** (carr. £1.50) |
| SINGLE MASTER PLINTH | **£14** (carr £1.50) |
| DOUBLE MASTER PLINTH | **£25** (carr £2.00) |

## *OFFICE MATE*

The popular Database, Spreadsheet, Beebplot and Wordprocessor on Disc
**£10**

## *OFFICE MASTER*

The popular Cashbook, Final Accounts, Mailist, Easiledger, INvoice & Statements and Stock Control
**£21**

## Money Management

This disc based software allows individual transactions to be stored and retrieved for upto 5 Bank a/c and 5 Loan accounts.

Price: Only **£11**

## L.B.O. Rom

### Life & Business Organiser

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are ever likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

**Price only: £17**

## *D D D Suite Integrated Software System*

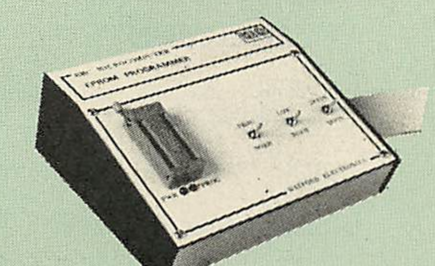
-BASE **£12**
-CALC **£12**
-PLOT **£12**
COMBO PACK All 3 together **£26**

Continued

## BOOKS (No VAT on Books)

| | |
|---|---|
| 30 Hour BASIC (BBC Micro) | £7.95 |
| 40 Best machine Code Routines | £7.95 |
| 6502 Assembly Language Program | £19.95 |
| 6502 Application | £11.95 |
| 6502 Assembly Lang. Subroutines | £19.95 |
| 6502 Development System | £7.50 |
| 6502 Machine Code for Humans | £7.95 |
| 68000 Assembly Lang. Programming | £19.95 |
| 68000 Machine Code Programming | £13.00 |
| 68000 Programming the | £22.95 |
| 6809, Programming the | £16.95 |
| A User Guide to Wordwise Plus | £9.95 |
| A Young persons Guide to BBC Basic | £5.95 |
| Advanced Disc User Guide | £16.95 |
| Advanced BASIC ROM User Guide | £9.95 |
| Advanced Machine Code Technique for BBC | £7.95 |
| Advanced Programming for BBC | £6.95 |
| **Advanced User Guide for BBC** | £15.95 |
| Advanced Graphics with BBC | £9.95 |
| Assembly Language Programming on BBC Micro | £11.50 |
| Advanced Programming Techniques for the BBC Micro | £8.95 |
| Adventure into BBC BASIC | £6.95 |
| Applied Assembly Lang. for BBC | £9.95 |
| Assembler Routines for the 6502 | £7.95 |
| Assembly Language Programming FOR the BBC Micro | £8.95 |
| Assembly Language Programming on the BBC & Electron | £8.95 |
| Basic Programming on the BBC Micro | £6.95 |
| Basic ROM User Guide | £11.95 |
| Basic User Guide for BBC Micro | £10.00 |
| BBC B+ User Guide | £14.95 |
| BBC Forth | £7.50 |
| BBC Micro & the small Business | £5.75 |
| BBC Machine Code Portfolio | £7.95 |
| BBC MAster 128 High Flyer | £10.95 |
| BBC Micro Advanced Ref. Guide | £10.95 |
| BBC Micro Advanced Programming | £10.00 |
| BBC Micro Book BASIC Sound & Graphics | £7.95 |
| BBC Micro ROM Book | £9.95 |
| BBC Micro Disc Companion | £8.95 |
| BBC User Guide | £10.00 |
| BCPL User Guide | £14 |
| Complete FORTH | £6.95 |
| CP-M-86 User's Guide | £19.95 |
| CP-M Bible | £16.50 |
| CP-M Handbook with MPM | £9.95 |
| CP-M Plus Handbook | £13.95 |
| CP-M Soul of | £16.50 |
| CP-M The software BUS | £8.95 |
| Creative graphics on BBC Micro | £7.50 |
| Disc Drive Projects for Micros | £5.45 |
| **DISC FILING SYSTEM (DFS) Operating Manual for BBC** | £6.95 |
| Disc Programming Techniques | £9.95 |
| Discovering BBC Micro Machine Code | £6.95 |
| Disc System for the BBC Micro | £6.95 |
| Exploring FORTH | £6.95 |
| FORTH on the BBC Micro | £7.50 |
| Functional Forth for the BBC Micro | £5.95 |
| Graphs? Charts on BBC Micro | £7.50 |
| Hackers Handbook | £4.95 |
| Hackers Handbook - New | £6.95 |
| Interfacing & Robotics on BBC | £15.95 |
| Into View | £4.50 |
| Introduction to COMAL | £9.50 |
| Introduction to LOGO | £6.95 |
| Introducing 'C' | £9.95 |
| Introducing LOGO | £5.95 |
| Introduction to FORTH | £8.95 |
| Introduction to PASCAL | £17.95 |
| ISO-PASCAL Reference Manual | £9.95 |
| LISP 2nd Edition | £14.95 |
| LISP, A Beginners Guide to | £10.95 |
| LISP the Language of Artificial Intelligence | £9.95 |
| Logo Programming | £9.95 |
| **Mysteries of DISC DRIVES and DFS REVEALED** | **£5.95** |
| Mastering Assembly Code | £8.95 |
| Mastering CP-M | £17.95 |
| Mastering Music | £6.95 |
| Mastering the Disc Drive | £7.95 |
| Master Advance Reference Manual | £19.95 |
| Master Reference Manual Part 1 | £14.95 |
| Master Reference Manual Part 2 | £14.95 |
| Micronet Handbook | £6.95 |
| Programming the 6502 | £16.95 |
| Programming the Z80 | £19.95 |
| S-PASCAL on BBC Micro | £7.50 |
| Structured Basic | £7.95 |
| Structured Prog. with BBC BASIC | £6.50 |
| Termulator Manual | £4.95 |
| The Complete FORTH | £6.95 |
| **The Epson FX-KAGA PRINTER Commands REVEALED** | **£5.95** |
| Turtle Graphics on BBC Micro | £7.50 |
| Using Floppy Discs with BBC Micro | £5.95 |
| View 3.0 User Guide | £10 |
| View Guide | £4.50 |
| Viewsheet User Guide | £10 |
| Viewstore User Guide | £10 |
| Using BBC Basic | £4.95 |
| Wordprocessing BBC Beginners Guide | £7.95 |
| Wordstar & CP/M made easy | £7.45 |
| Wordwise Plus Guide | £9.95 |
| Z80 Applications | £15.95 |
| Z80 Assembly Language Programming | £19.95 |
| Z80 Reference Guide | £9.95 |

## EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

**SOFTWARE PACKAGE**
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette-disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

**Software facilities include:**
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

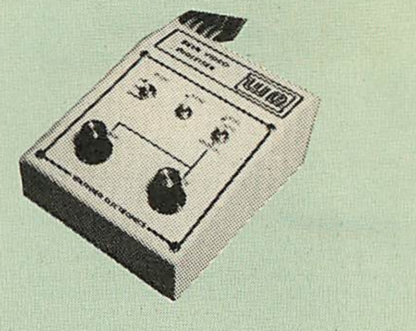
**SPECIAL OFFER £69** (£3 carr.)

## TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

## *BEEB* VIDEO DIGITISER



Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

**£99** (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

## *Magazine Maker*

(As seen on TV)
A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£119.00** (carr. £3)

## VOLTMACE JOYSTICKS

| | |
|---|---|
| Delta 3B Single Joystick | £10 |
| Delta 3B Twin Joysticks | £16 |
| Delta 14B Single Joystick | £12 |
| Delta 14B/1 Adaptor Module | £12 |
| Transfer Software Disc-Tape | £7 |

## ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

Price: **£2**

## SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources which put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£6.99**

## ATTACHE CARRYING CASE for BBC Micro

This attache carrying case is attractively finished in mottled antique brown leatherette. An ideal and safe way of carrying your BBC Micro around. Supplied with two Keys.

Price: **£13** (£2 carr.)

| | |
|---|---|
| **28 pin ZIF SOCKET (Textool)** | **£6.95** |

**28pin DIL HEADER PLUG**

| | |
|---|---|
| SOLDER type | £1.50 |
| IDC CRIMP type | £1.95 |

## SPARES for BBC Micro

| | | | |
|---|---|---|---|
| Keyboard | £46 | Keystrip | £2 |
| UHF Modulator | £4 | Case | £25 |
| Speaker Grill | £1 | Speaker | £2 |
| Power Supply | £59 | Keyswitch | £1.50 |

## Replacement FLEXIBLE Keyboard Connector £3

**8 WAY DIP SWITCHES**

With these DIP switches soldered to their keyboard, any BBC B or B+ owner can take full advantage of the fast disc drives that we supply by configuring his BBC for fast disc drive operation.

Excellent value for money at **85p**

## CONNECTING LEADS

(All ready made and tested(

| | |
|---|---|
| CASSETTE LEADS 7 pin DIN Plug | |
| to 5 pin DIN Plug + 1 Jack Plug | £2.00 |
| to 3 pin DIN Plug + 1 Jack Plug | £2.00 |
| to 7 pin DIN Plug | £2.50 |
| to 3 Jack Plugs | £2.00 |
| **6 pin DIN to 6 pin DIN Plug (RGB)** | **£2.50** |

**DISC DRIVE POWER LEADS**

Supply from BBC power supply to standard Disc Drive connector.

Single **£3.00** Dual **£3.75**

**DISC DRIVE INTERFACE LEADS**

BBC to Disc Drives Ribbon Cable

Single **£4** Twin **£6**

## MISCELLANEOUS CONNECTORS

| | Plugs | Sockets |
|---|---|---|
| RGB (6 PIN DIN) | 30p | 45p |
| RS423 (5 pin Domino) | 40p | 50p |
| Cassette (7 pin DIN) | 25p | 65p |
| ECONET (5 pin DIN) | 20p | 30p |
| Paddles (15 pin 'D') | 80p | 200p |
| BBC Power Plug 6 way | 80p | – |
| Disc Drive Plug 4 way | 75p | – |
| 6 way Power Connector | – | 95p |

# *Watford Electronics' Dealer's List*

**UNITED KINGDOM**

Badger Micros (Devon), Badger's Hill, Southerton, Ottery-St. Mary, Devon EX11 1SE. Tel: 0395 68516.

Beebug Retail, Dolphin Place, Holywell Hill, St. Albans.

Cirkit Distribution Ltd, Park Lane, Broxbourne, Herts.

C.J.E. Micros, 78 Brighton Road, Worthing, West Sussex. Tel: 0903 213361.

Dennis Spitz Computers Inc, 86 Golders Green Road, London NW11.

HCCS, 575-583 Durham Road, Low Fell, Gateshead, Nr. Newcastle Upon Tyne. Tel. 091 4870760.

Mancomp Ltd, Printworks Lane, Levenshulme, Manchester. Tel: 061-224 1888-9888.

Microman Computers, Rainford Industrial Estate, Mill Lane, Rainford, St. Helens

Peartree Computers Ltd, St. Georges Street, Huntingdon Cambs.

Verospeed Ltd, Boyatt Wood, Eastleigh, Hants.

**OVERSEAS DEALERS**

*Absolute Electronics, Rewal House, 208-210 La Trobe Street, Melbourne, 3000, Victoria, Australia. Tel: (03) 663 2411.

Alpha Computer Co, Shop 314 Chi Fu Commercial Centre, Chi Fu Fa Yuen, Hong Kong, Tel: 5-506592.

Computer Distribution Company, Parklaan, 47, B09300 Aalst, Belgium.

Lendac Data Systems, Unit 31, IDA Enterprise Centre, Pearce Street, Dublin 12. Tel: 710796.

Scientex P.V.B.S., Zilversmidstraat 2, B-2000 Antwerpen, Belgium, Tel: 03 233 59 06

Techno-matic Data, Holbergsgade 19, 1057 Kobenhavn K, Denmark

*Velobyte, Scheaedyksadyk 5a-6a, 3011 EB Rotterdam, Holland, Tel: (010) 413 8197/414 5171.

Viking Tecno, Vestergade 12.1, 9620 Aalestrup, Denmark, Tel: 08 642522

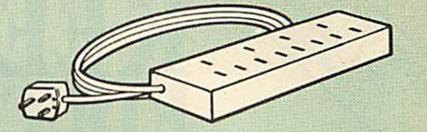
*Acorn/Watford Referral Centres.

## Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro & Master with the Viglen console unit.

BBC **£42**; Master **£51** (carr. £4)

## 4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

**£9.50** (carr £1.50)

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BBC B, B+ & Master Compatible.

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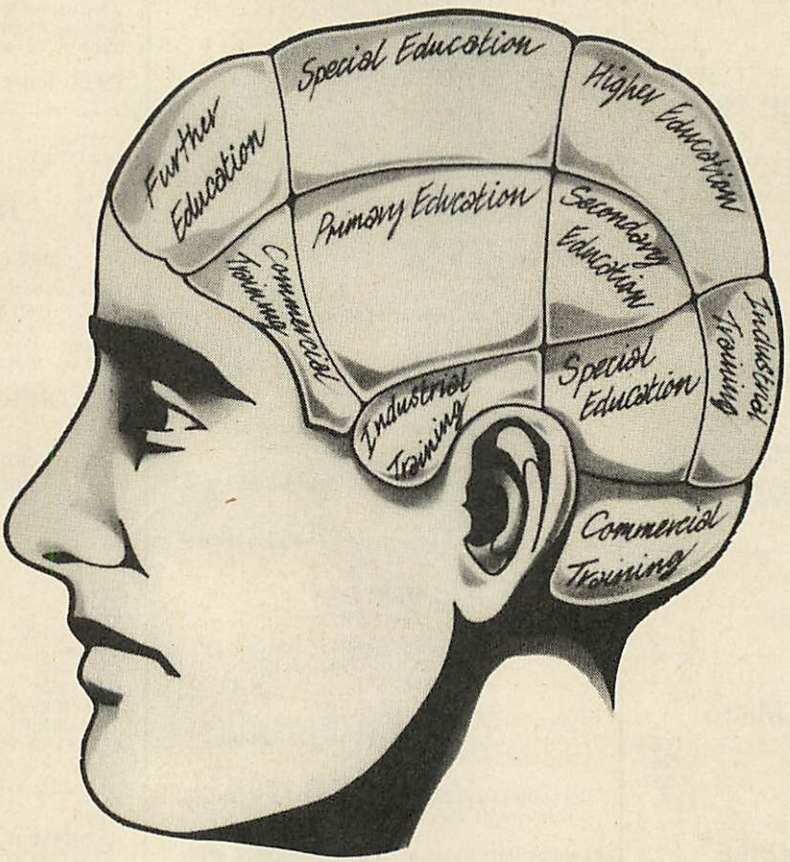
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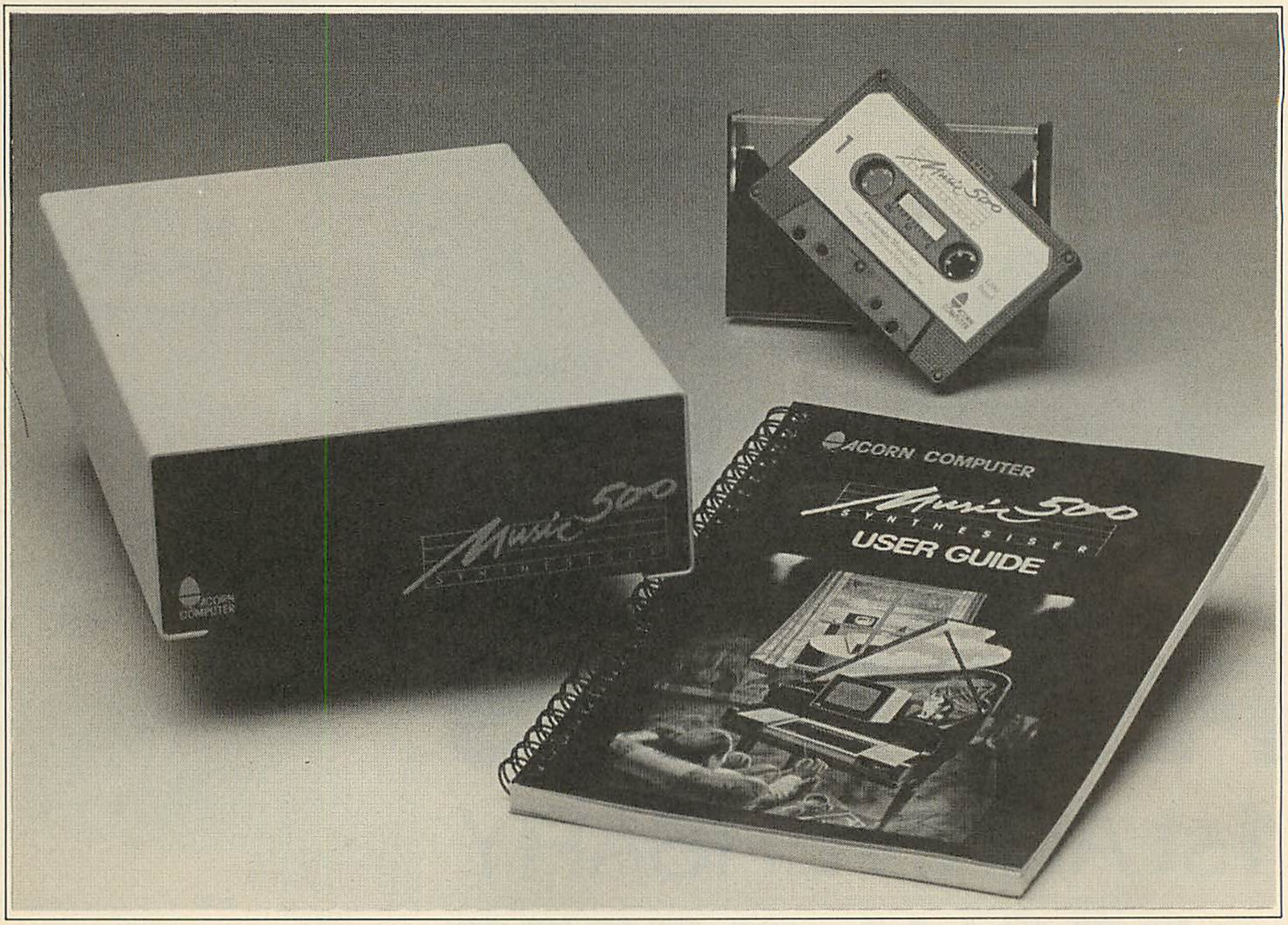
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*Acorn User Magazine*
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BBC B, B+ & Master Compatible.

Now available, a limited number of Music 500s at give away prices. For under half the normal cost of the Music 5000 (which is, basically, the same hardware) you can receive the music package that has already thrilled thousands.

**CHRISTMAS PRICE £66** *Excluding VAT*
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Software Disc 'Mu-500' has 13 tunes **Only: £6**

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Why pay those prices for the Music 500 when you can buy them for

**£39.95** *Excluding VAT*

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Total cost including software and VAT

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*November Issue*
*Acorn User Magazine*
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- 1770 DFS

**HC5 BBC B inc DFS** £305.00
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- Includes Acorn DFS

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- Multi user-friendly input modes for ease of use
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- Includes a step-by-step beginners guide

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- Takes existing ROM software in cartridge form
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**HP11 ADFS ROM FOR 1770 OR BBC B+** £29.00
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- Allows a BBC to be a printer server when Econetted

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- Plus into 1 meg bus
- Complete with ADFS and file server manuals
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- IBM compatible
- Extremely robust
- Complete with tractor feed

**PW49 JUKI 6100 PRINTER** £250.00
- 18CPS
- Standard ribbons
- Very reliable
- Centronics interface

**PD217 MP165 DOT MATRIX PRINTER** £199.00
- 165CPS draft print
- 38CPS near letter quality
- Built in tractor feed
- Epson compatible
- Downloadable character sets

**PD39 EPSON LX80** £225.00
- 100 CPS
- NLQ mode
- Centronics interface

**PP52 EPSON LX80 TRACTOR FEED** £18.00

**PP54 EPSON LX80 SHEET FEEDER** £49.00

**PD40 EPSON FX85** £399.00
- 160 CPS
- Downloadable character set
- Centronics interface

**PD41 EPSON FX105** £499.00
- As above with wide carriage

**PD53 EPSON FX85 TRACTOR FEED** £37.00

**PD42 EPSON LQ800** £595.00
- 24 pin head
- 180 CPS
- Excellent near letter quality

**PD43 EPSON LQ1000** £795.00
- Wide carriage version of above

**PW218 KAGA TAXAN KP810** £299.00
- Low cost NLQ printer
- Built in tractor feed
- 160 CPS

**PD44 KAGA TAXAN KP910** £389.00
- Wide carriage version of above

**PD45 BROTHER M1509** £399.00
- 180 CPS
- Built in tractor feed
- RS232 and Centronics interface
- IBM compatible
- Full international character set
- Epson compatible

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### Colour

**SUPER VALUE**

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- Medium resolution
- RGB interface
- Composite video and sound input
- Anti-glare filter

**HP58 MICROVITEC 1451 COLOUR** £245.00
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- Metal or plastic case
- RGB interface
- Complete with cable for BBC

**HP59 MICROVITEC 1451 A/P** £275.00
- As above with audio and composite video input

**HP60 MICROVITEC 1441 COLOUR** £450.00
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- 895 pixels
- RGB interface

**HP61 TAXAN SUPER VISION 3** £349.00
- Compact 12" super high resolution RGB colour display
- Text switch gives green display
- Super high contrast tube
- 640 × 252 line resolution
- 0.37 dot pitch

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- High res green monitor
- As preferred by educational establishments

**HP65 KX1201 KAGA GREEN (P31)** £89.50

**HP66 KX1202 KAGA GREEN (P39)** £95.50

**HP67 KX1203 KAGA AMBER (PUL)** £95.50
- P31 standard persistence
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- Greater than 20MHz bandwidth
- Flat 635R tube
- 1000 line resolution at centre

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*(ACORN USER magazine review, April 1986)*

## PROFIT

A complete business system for only **£69** — **SA219**

*Requires shadow RAM to run Profit*

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* For Master or BBC B+
* Will work in BBC B with sideways RAM
* Supplied on 40/80 track disc

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* Compatible with many 1770 DFS kits

**SU222 ROM MANAGER — £9.95**
* 16K ROM
* Only for BBC
* Contains RAM editor, ROM switch, ROM list
* ROM checker, image saver, image loader
* Basic to ROM image converter

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**SW71 WORDWISE — £27.00**
* Mode 7 editing
* Preview in mode 0 (80 cols)
* Can produce ASCII text for modems

**SW72 WORDWISE PLUS — £45.00**
* As above with multi document editing
* Built in programming language for data handling

## SPECIAL OFFERS

**SS73 INTER-SHEET — ~~£45.00~~ £35.00**
* 40, 80 and 105 column mode
* Multiple spreadsheets in memory
* 64 by 255 sheet size
* ROM link

**SP74 INTER-CHART — ~~£30.00~~ £23.00**
* Built in Epson screen dump
* Supports pie, line and bar charts
* Line and bar graphs can be displayed on the same axis
* Automatic scaling
* ROM link

**SW75 INTER-WORD — ~~£45.00~~ £38.00**
* 80 or 105 column word processor
* Continuous documents limited to disc size
* Editing operations similar to Wordwise
* ROM link

**SD76 INTER-BASE — £55.00**
* Compatible with all filing systems
* Contains powerful Basic-like programming language
* Card index mode
* Powerful customising mode
* Max 250 fields per record
* Max 32K per field
* Variable field lengths and records
* ROM link

**SU77 ACCELERATOR — £51.00**
* Basic compiler
* Can produce ROM/RAM format code from Basic programs
* Comprehensive manual

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**SW79 TERMI2 — £28.00**
* VT52 terminal emulation
* Complete with file transfer software
* Easy to use menu options
* Custom configurations can be stored on disc

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* As above with VT100 emulation

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* Can be used in any mode
* BBC B, BBC B+, 6502, Shadow RAM, DFS and ADFS compatible
* Complete with comprehensive manual

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* Compatible with complete View range
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* Windows can be selected for printing

**SD84 VIEW STORE — £34.00**
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* File size limited only by disc storage size
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**SW85 VIEW SPELL — £30.00**
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**SG86 VIEW PLOT — £25.00**
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* Compatible with Viewsheet

**SW87 VIEW INDEX — £15.00**
* For View
* Automatically creates index
* Notes page numbers
* Sorts alphabetically

**SU88 VIEW PRINTER DRIVER GENERATOR — £9.00**
* Used to personalise View documents to include special printer features

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* Extends plot ANV VDU commands to provide: circle plotting, ellipses, parallelograms, dotted and dot dash patterns, shading patterns, colour fill, shade fill and sprites
* Built in sprite designer
* Please specify BBC B or BBC B+

**SL90 ISO PASCAL — £52.00**
* Full implementation of the ISO standard
* Can use BBC's sound and graphics
* Compiles to a compact intermediate code
* Complete with demonstration disc

**SL91 LOGO — £52.00**
* Good introduction to computing for children
* Turtle graphics supported

**SC92 TERMULATOR — £27.00**
* Terminal emulator ANSI (VT100), VT52, Tektronix 4010, dumb terminal, hardcopy terminal and a special BBC terminal
* Enables the host computer to be sent directly to the BBC's output driver

**SL93 COMAL — £39.00**
* Programming language standard in many European countries
* Encourages structured programming

**SL94 BASIC EDITOR — £25.00**
* Powerful full screen editor
* Many word processor functions included

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* Designed to emphasise human logic rather than machine procedure
* Step closer to artificial intelligence
* 6502 compatible

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| SU103 EXMON 2 (ROM) | £20.00 |
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| SU106 DUMPMASTER 2 (ROM) | £20.00 |
| SU107 DUMPMASTER (DISC) | £10.00 |
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- British Telecom approved
- Complete with cable for BBC computer
- Socket for through connection of telephone

**HP134 PACE NIGHTINGALE COMBO — £129.00**
- As above with Commstar software

**HP135 PACE ACCESSORY BOARD — £42.00**
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- Built in loudspeaker for monitoring

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- Create your own bulletin board
- Create your own office answering service

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- British Telecom approved
- 25 way RS232 input

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- Intelligent speed buffering
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- Internal battery backup allows 63 names and numbers to be stored
- Printer port for direct connection to a printer
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- Juki 5510 printer
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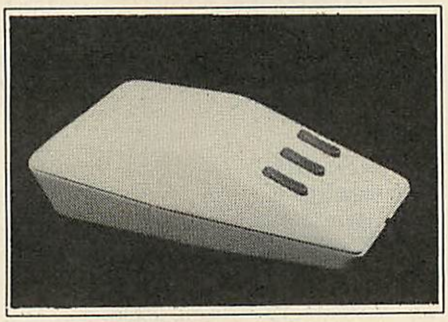
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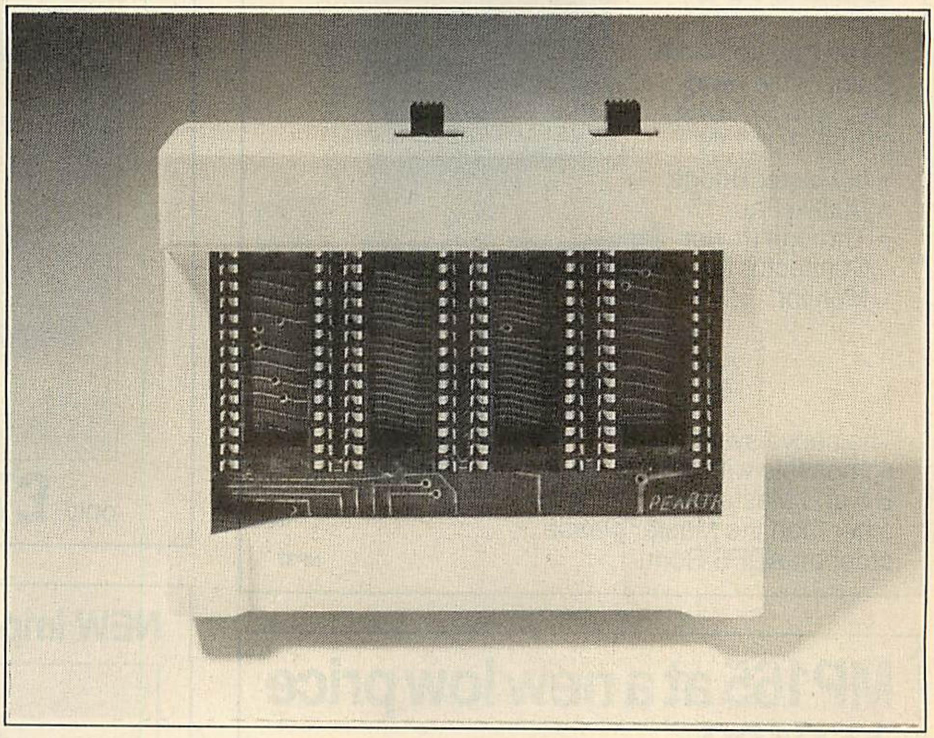
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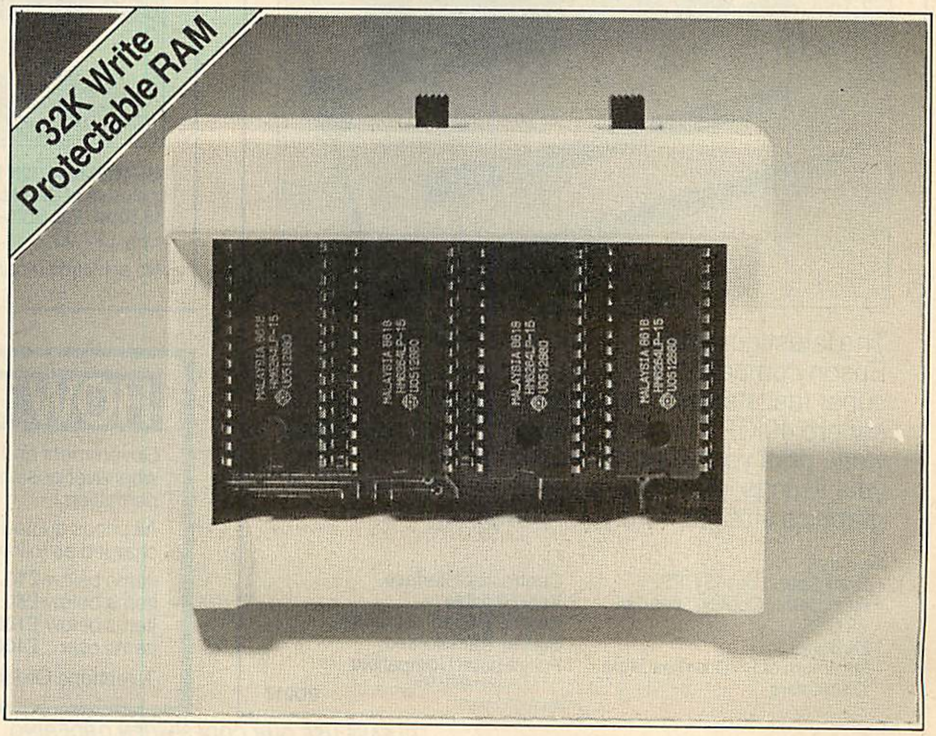
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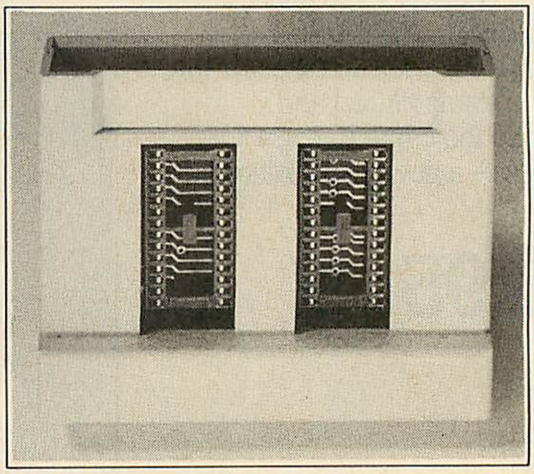
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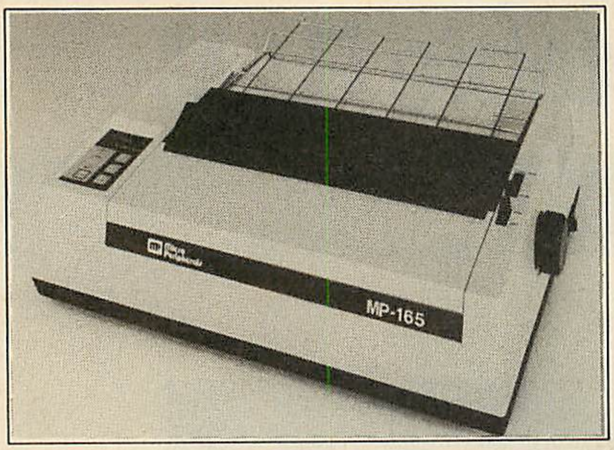
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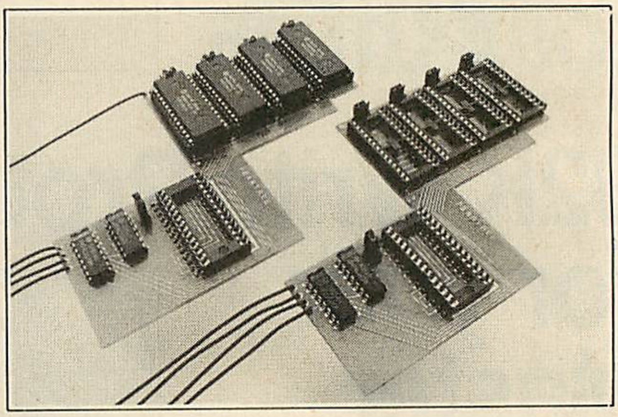

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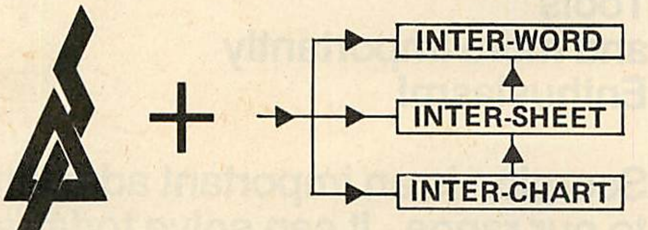
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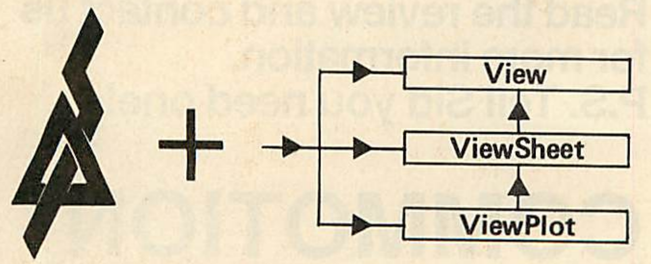
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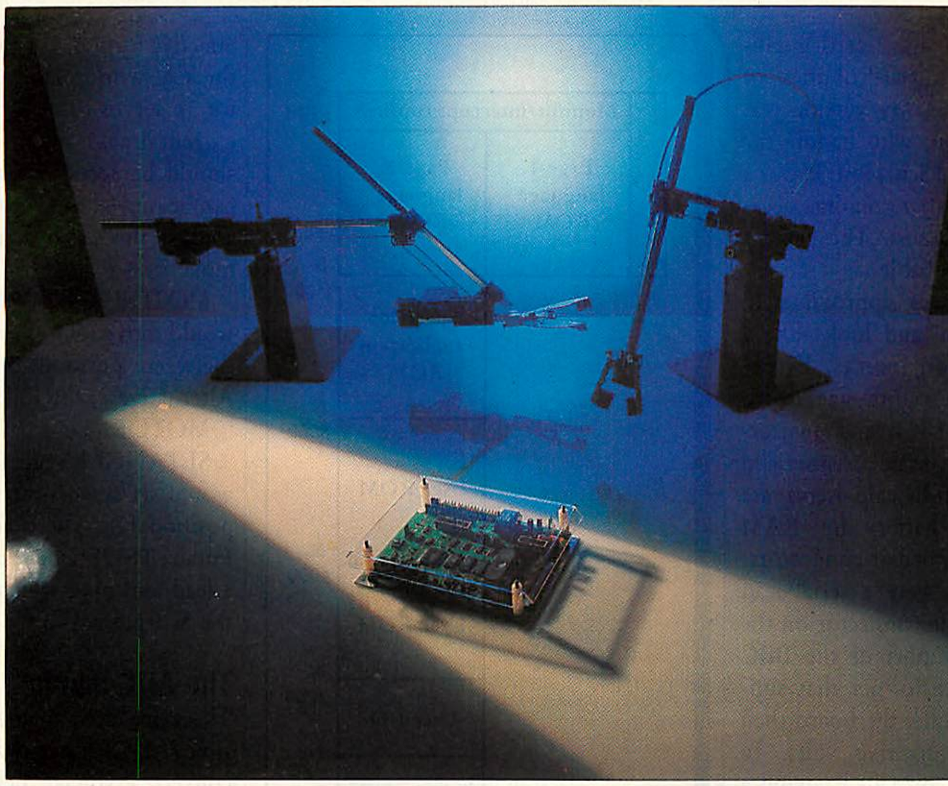

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# SCORPION RISING

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***Joe Telford***

That morning at Telford Towers, the robot arm was sulking again, refusing to strike the meal-time gong and instead was doing an introspective thumb-nail sketch of a Mandlebrot curve using infinite recursion. The family greeted me with more problems. The Nestec buggy had cornered the house tabby and refused to let it out of a corner, the microwave had devoutly spent a full hour scrambling four-minute eggs, and the toaster, in a schizophrenic fit, had turned into a clay-pigeon hurler.

Something clearly needed doing. I deftly caught an orbiting piece of toast, prised a wedge of scrambled leather from the microwave and sat down to consider things over breakfast. What we really needed was some sanity. Unfortunately, the relative ease with which a BBC micro could be turned to the task of controlling an individual household appliance was not a satisfactory solution – it would make the average toaster cost over £500 – and controlling multiple devices at the same time is something that the common or garden micro is not too good at. In addition to which I felt that the judicious application of a service electrician would cure the toaster and microwave of their problems.

However, the thought lingered that it might be useful to learn a little about controlling a number of devices at once. The BBC micro of course, has the equivalent of eight output control lines via the printer, and a further eight input/output lines via the user port. The analogue connector gives two further input lines and four lines which can be used to measure changes in the environment. These are the Adval channel lines. Other than the cassette relay, which is available to users, the rest of the control capacity of the BBC micro must be unleashed using more exotic devices on the 1MHz bus. All the same, the BBC micro has a lot more potential than many of its classmates.

## Enter the Scorpion

What, you could be forgiven for asking, could have well over two and a half times the input/output (IO) capability of a BBC micro, plus the capacity to run a dozen programs simultaneously? The answer

PHOTOGRAPH BY PAUL DUNN

comes in the form of a single-card intelligent controller from Micro-Robotics of Cambridge, the Scorpion. My version was supplied by Commotion, who handle the education market for the Scorpion. It was a prototype which meant that gremlins occasionally crept into programs. The current version is much more reliable.

The Scorpion measures approximately 6.5in by 4.5in by 1.5in, and looks like a single card computer for gnomes. Everything is tiny, from an eighth-size micro processor (the Hitachi 6303) and quarter-size RAM chips to tenth-scale resistors and transistors. The only full-scale items are two ROM sockets, a battery for RAM backup, and a large number of connectors.

The only accessories were a serial lead which connects from one connector on the Scorpion to the RS423 port of the BBC micro, and a mains transformer that supplies the raw power, which the board then stabilises and reduces to five volts. In addition, a manual was provided, giving a great deal of information. It isn't immediately obvious, but although the interfaces to the outside world are present on the Scorpion, the actual control devices, eg, the servos, sensors, motor network cards and so on, are all extras, not included in the basic cost of the Scorpion.

With a microprocessor on board the Scorpion, its potential for control seems high. Add to this the fact that the board holds 24k of low power (CMOS) programmable memory, and data-logging becomes possible. But when you consider that one of the two ROM sockets is filled with 32k of combined operating system and high-level language, the possibilities suddenly become quite amazing.

The language is, in many ways, like Logo, with the added value of being able to run almost any number of programs simultaneously. This means programming is both simple and powerful.

The Scorpion is a complete computer in its own right and can get by without a BBC micro, although the micro provides a friendly terminal for programming, filing, co-processing and slave processing.

The 6303 is rather like the 6502 microprocessor, and even more like the 6809 mpu. Figure 1 shows the memory map of the system. In the Scorpion, all the system IO is memory mapped to the first 4k. The next 4k is available as an expansion bus for users. The next 24k is RAM, or programmable memory, and this is followed by a 16k area for specialised programs in an extension ROM, which users themselves will be

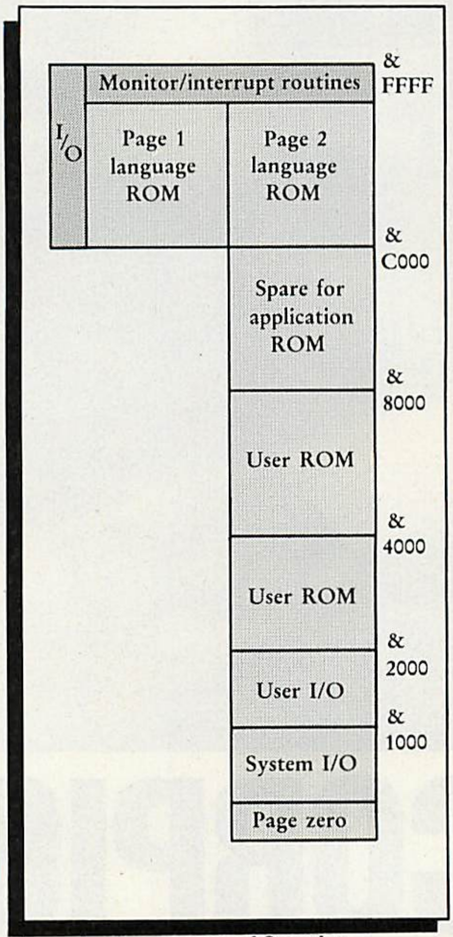



**Figure 1. Memory map of Scorpion**

able to configure and add. The last 16k of memory holds 32k of code in two 16k chunks, which the computer switches in and out as necessary. This area also allows access to some further IO.

While we may exhibit surprise at fitting a computer with a high-level language onto this tiny card, this is compounded by the discovery that the computer has attached to it a wide range of interfaces, ready to plug-in and go. A sample of its onboard facilities include: a real-time clock calendar, 16 servo drivers, eight analogue/digital inputs, four 100 milliamp digital outputs, two shaft-encoder inputs, a user port, a stepper motor port, an LCD display driver, a 20 key keyboard decoder, an I∧2 C expansion network, the serial link and the battery back-up, along with a standard expansion bus and a reset connector. Figure 2 shows the layout of the main features of the Scorpion board.

## The servo drivers

Regular readers of *Acorn User* will remember previous reviews of a system called Beasty, a simple Micro-Robotics robot arm driven by servo motors. The positional accuracy of servos is quite high, and their load bearing capabilities make them a cost effective form of controlling mechanisms in the real world. The Scorpion has facilities for 16 servos to be accessed. However, the current drain is high, so no more than eight should be accessed simultaneously. Servos can be moved using two commands, one to address the servo in question and one to move it:

MOTOR 1 SETANGLE 128

would move servo motor 1 to position 128 (between position 0 and position 255). Alternatively, the following lines:

MOTOR (1 2 3)

SETANGLE (128 128 128)

would set servos one, two and three all to position 128. The typical servo could be a Futaba PS128 which comes complete with a lead and plug which attached directly to the Scorpion.

## The ADC inputs

There are eight analogue to digital conversion (ADC) input channels. Each line can convert a voltage between zero and five volts to a number from zero to approximately 2000. The command to initiate a conversion is SENSE followed by the channel number:

temp := SENSE 1

reads the value of ADC channel one into a variable called 'temp'. The range of sensors for these ports include thermistors, light dependent resistors, potentiometers, and a wide range of switches. The ports are directly compatible with the Beasty sensor pack, which provides a range of sensors for use with the BBC micro. For users with knowledge of building simple electrical circuits, figure 3 shows some typical sensor circuits which work with Scorpion.

## The four digital outputs

These four outputs are driven by tiny transistors to control continuous currents of 100 milliamps, although each one will survive a maximum current of half an amp for a short period of time. I would never connect a motor to these output lines, preferring instead to drive a simple relay, which could then control much larger currents. It would have been useful to have eight or 16 such drivers, rather than the four available, so that parallel control work with, for example, buggies could have been carried out.

## The shaft-encoder inputs

Scorpion has two channels devoted to shaft-encoding. A shaft-encoder is a device rather like a volume control or potentiometer, which can rotate continuously and

generate two sets of pulses which are counted by the computer. Counting down represents turning in one direction, while counting up represents turning in the other. Shaft encoders can be used typically to increase the accuracy of DC motors, making them approach stepper-motor accuracy, while at the same time using their higher speed.

## The user port

To those of us who are aware of the facilities on the BBC micro's user port, the Scorpion port is an amazing piece of design. It contains six specialised signal lines which can perform a range of functions:

a) one line can transmit and receive serial data at up to 0.5MHz

b) another signal can generate pulses of variable width

c) another line can receive pulses at rates up to 0.5MHz

d) another can generate a 1ms accurate wave form.

In addition to these, the Micro-Robotics EVI solid state vision system will plug directly into the port. A range of commands gives Scorpion and the EVI sight and visual comparison capabilities.

## The stepper motor port

This port is available to drive up to six stepper motors. Unfortunately I was not able to test it out in practice, and the current manual gives little advice.

## The LCD display driver

This port is dedicated to driving one of the many liquid crystal display (LCD) devices now available from Hitachi. The display can have up to 80 character spaces available, and the command displays duplicate the Print command, simply directing characters to the display, so:

LCD "HELLO CHEEKY"

LCD "Motor 1 is set to" ,ANGLE 1

LCD ["Don't print a RETURN after this line"]

are all acceptable as is Scorpion's PRINT-TAB facility:

LCD GOTOXY (5,1), "This is line 1!!!!"

## The keypad driver port

This port allows a simple 20 key keypad to be added to Scorpion, and this is only a few seconds' work. Scorpion can be programmed to take input from the keypad and in conjunction with calculator style (LCD) display, we have a simple terminal facility which replaces the host computer in many applications. The keypad has three commands which are invaluable in its use:

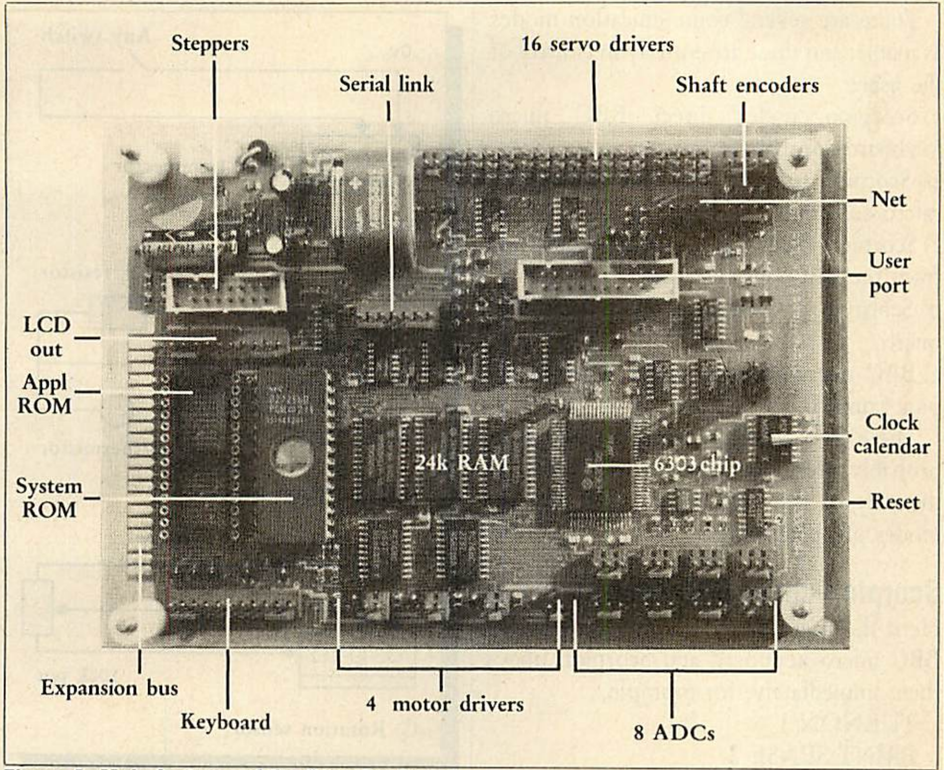



**Figure 2. Main features of the Scorpion board**

value:= GETKEY

waits until a key is pressed and stores the key number in the variable value called.

PRINT PRESSED ‹key›

reports whether ‹key› is currently pressed.

PRINT PRESSED~ ‹key›

reports whether the key was pressed since the last pressed command.

## The local device network

This is called the I∧2 C net (pronounced, 'eye squared see') and extends the power of the Scorpion to a range of additional devices, which as long as they are designed for the I∧2 C net can be simply added to the network by linking on a five wire bus.

This peripheral network is a Very Local Area Network (VLAN) and is already supported by Mullard, who produce a whole range of chips to perform various functions. Among these are: teletext display, speech synthesiser, 256 byte RAM, 256 byte EEPROM, eight bit digital IO port, LCD driver, AD/DA convertor, DTMF generator, relay driver, infra red decoder and clock-chip.

Currently Micro-Robotics supply a relay driver for the net, and I am very impressed with this initial add-on. The commands which drive the network are quite simple to use and behave as functions or commands:

NET 64,0 transmits an 'all on' command to the relay board

NET 64,255 turns the relays off

It is possible to PRINT NET 64,0 and the value printed tells whether the relay board is listening, with zero for no and minus one for yes. Once the device has been contacted, it can be talked to directly with:

NET PUT ‹value›

where ‹value› is any number between zero and 255.

PRINT NET GET

reads a value from an input device and:

PRINT NET GETNAK

reads a last input indicating that the device should go dormant.

## The serial link

Communication between Scorpion and the BBC micro is via a 9600 baud RS232 link. If you have a Master, then its terminal software will drive the Scorpion link satisfactorily. With a standard BBC micro, then it would be wise to invest in some terminal software, and again Micro-Robotics can supply a suitable ROM.

As with most new devices, the software and its ease of use is of paramount importance. The Scorpion is no different. On connecting to the BBC micro and invoking the terminal software on the BBC micro, the usual prompt is:

—›

which indicates Scorpion is ready to listen. For various reasons, occasionally this doesn't appear, and can be remedied by powering Scorpion off then on again. If this fails then shorting two reset pins onboard the Scorpion always works.

There are several communication modes available, and these are entirely in control of the user:

a) Scorpion under direct BBC micro keyboard control

B) Scorpion running programs under BBC micro control

c) Scorpion running programs detached from the BBC micro

d) Scorpion co-processing with the BBC micro

e) BBC micro running under direct Scorpion control.

These five ways of using the Scorpion probably represent levels of awareness on the part of the user, rather than any set modes of operation.

## Scorpion under BBC control.

Here the user can type commands at the BBC micro keyboard and Scorpion obeys them immediately, for example:

```
TURNON 1
PRINT SENSE 2
ANGLE 3 := SENSE 4/8
```

are typically direct commands.

We have already seen how the Scorpion Programming Language (SPL) is like Logo, and given that its major failings are the lack of strings and lists, it is a very powerful language. If a program like the one shown in listing 1 is typed at the BBC micro keyboard then Scorpion will store it in RAM and the program can be either edited or executed by simply calling its name.

Listing 1 in this month's yellow pages is a program to decode the key presses on a Tandy Electronic Book, which can form the basis of a simple instrument panel. The program has three components, the main procedure RB, which calls on READBOOK and this in turn calls DECODE. Notice that RB is a command while READBOOK and DECODE are functions because they return values. Refer to last month's jottings on using functions and procedures.

The program can be executed by simply typing RB and pressing Return. While RB is operating the —› prompt vanishes. This of course is a problem, and so to stop RB running we press CTRL-C on the BBC micro. Now we can read the value of the variable 'book'. This is rather like Logo on the BBC micro, but now things become much more impressive. Rather than write a complex program to call RB whenever we want to read the Electronic Book. We simply type START RB and press return. The —› prompt returns but if we type another program:

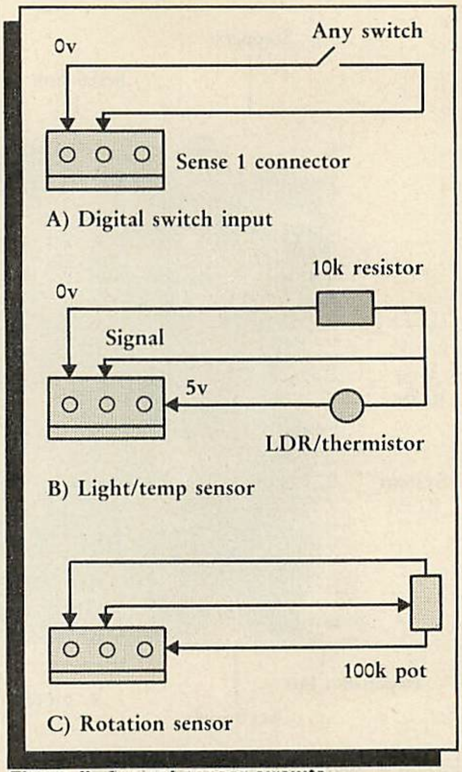



**Figure 3. Typical sensor circuits**

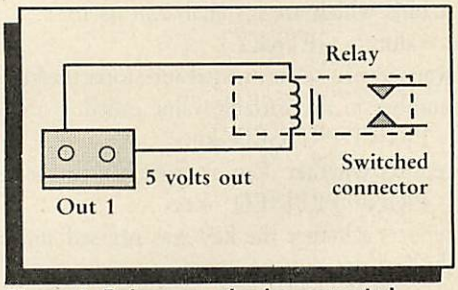



**Figure 4. Relays can also be connected**

```
FOREVER PRINT book
```

we can see the value of book changing as we press. The FOREVER PRINT book program is running at the same time as RB. This is called multi-tasking, and means a number of programs can be run at the same time simply by typing:

```
START RB
START JIMSPROG
START COUNTING
START LOGGING
```

and the tasks currently running can be listd LIST TASK and stopped using STOP ‹tasknumber›.

Multi-tasking is very important, not just because it gets a number of things done at once, but because it provides us with a computer which can be used by a number of users at once. This is particularly useful in education, where the Scorpion can cater for whole groups of students on an individual basis.

Once a program is tested and confirmed operational, then that program can be started as a task, and unless it needs to report back, it can progress without the BBC micro. If we add the liquid crystal display and keyboard then we have a means of reporting to the user without accessing the BBC micro. Allocating 20 characters of display per user gives us a four-user computer without the need for the micro, so the next stage is to disconnect the serial link.

The Scorpion continues functioning, and the BBC micro can be pressed into service for wordprocessing or another task. If before disconnecting the Scorpion-BBC micro link, we write a program which starts all the tasks eg:

```
TO startofday
   START task1
   START task2
   START task3
   START task4
END
```

then issue the command:

```
STARTUP startofday
```

and the Scorpion, with its battery back up, develops the memory of an elephant! Disconnect the Scorpion from the BBC micro, unplug its power supply unit and drive 100 miles to the control site for your project, reconnect power and immediately Scorpion automatically begins to do the four tasks which you taught it, despite not having a BBC micro anywhere in sight!

The multi-tasking capability sets the Scorpion apart. The day of the central heating computer, which acts as a burglar alarm, electricity economiser, rain detector, weather station, and potential mobile robot is almost here. Listing 2 shows a second program which used the RB task to drive an instrument control panel on a Tandy Electronic Book. The control panel, which is shown in figure 5, controls the position of three servos, which might for example make up a robot arm.

## Co-processing

The Scorpion and BBC micro can work in harmony, with the BBC micro handling filing or graphics, while the Scorpion conditions input signals, and if necessary drives output lines.

Listing 3 is an SPL program which senses, scales and temperature reads into ADC port three. It then prints the result over the serial link, where a BBC micro program is waiting to process the numbers, see listing 4. Notice the * FX2,1 switches BBC micro input to the RS423 port and as each number enters the BBC micro, it is plotted as a temperature graph.

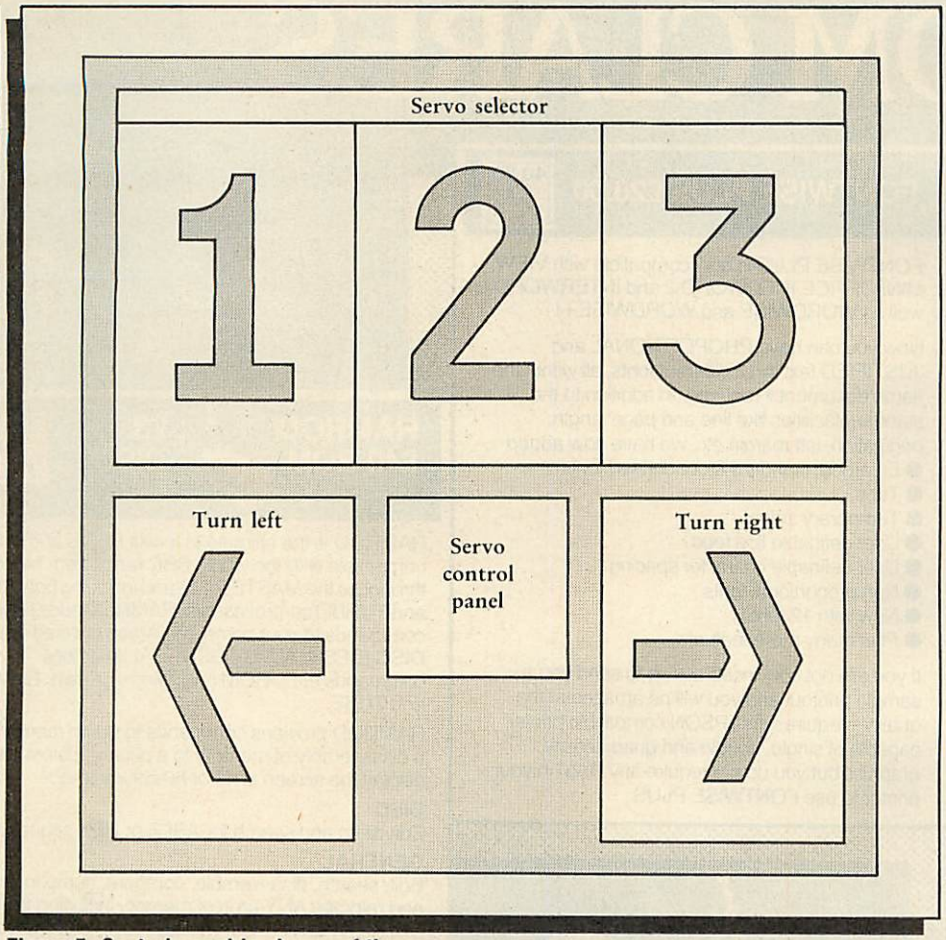



**Figure 5. Control panel in charge of three servos**

## Scorpion in control

Listing 4 demonstrates the ability of the Scorpion to issue direct commands to the micro. The Scorpion program is turnkeyed with:

STARTUP LOG_TEMP

then the BBC machine is set up as a slave micro by typing:

f$="TEMPFILE"

*FX2, 1

Next the Scorpion is powered up and executes its program, using the BBC micro's current filing system to log its data. Listing 5 shows a simple BBC micro program to retrieve and plot the Scorpion-generated file.

It is usual with a new computer to perform the kilobaud bench tests, but two things cause problems. First, the bench tests are in the process of being rewritten for more sensible use on the new generation of machines available. Second, the Scorpion user will have different needs to the micro user. Consequently, I have modified the bench tests and selected four which demonstrate the Scorpion's features. Listing 6 is the benchmark programs and table 1 on the yellow pages gives the performance of Scorpion for each one.

Each bench test is re-written three times so an estimate of overheads involved in multi-tasking can assessed. The bench tests appeared slow in comparison with BBC Basic, but similar to Logo.

Each bench test is run separately and then multi-tasked. The overheads above the standard run time are expressed as a number of seconds per task.

## Scorpion verdict

This concludes the guided tour of the Scorpion's capabilities, but begs the question, 'who needs a Scorpion?' If your tongue is hanging out in delight at the features available, you are one of the possible customers for the device.

The main thrust of Scorpion must be in education, particularly in terms of colleges of further and higher education, and I would be surprised if such institutions did not, over the next few years, purchase Scorpion in quantities. There is certainly a market for the Scorpion in the 14 to 18 year old age group, particularly where new GCSE courses are looking for technological material which is easy to use and oriented towards problem solving. Whether there is a place for Scorpion at an even earlier learning stage is open to question. My own daughter (aged nine) built a dolls' playground based on servos, and wrote the driving software with some assistance. The finished project took an afternoon, and a good deal of sticky tape. I expect that far-sighted teachers will be able to make use of Scorpion at almost any level, to enhance existing good practice.

The industrial market is more difficult to assess, but training is of obvious importance. Hobbyists too provide a potential market for the Scorpion, although some prior experience with control interfacing might be an advantage.

Essentially, the Scorpion scores with its wide range of interfaces and its ease of programming. The multi-tasking stands out as being very impressive. The battery back-up and turnkey auto-tasking are equally impressive, but mainly it is a very powerful solutions machine which must improve our problem solving capabilities. The other benefit of buying Scorpion is that the distributors run a 'second to none' support service with handy hints, leaflets and problem solving over the phone.

The problems which I had were all due to having an early version of the micro and software. Some commands appeared to have been grafted onto the language. . .for example, SETANGLE isn't appropriate for a linear servo and TURNON should behave like MOTOR ie, MOTOR (1 2 3) therefore TURNON (1 2 3).

The second area of concern was the robustness of parts of the board under stress conditions. What happens when a tiny transistor blows? Of course respect for the operating conditions is down to the user, but my third aggravation is with the manual which should be more explicit and contain a larger tutorial section. It would also be wise to point out hardware tolerances and to indicate some means of testing the interface hardware, before considering a possibly expensive repair.

If you are at all keen on or capable in this area of computing, and have the money, then you could do a lot worse than to buy a Scorpion. If you are on a budget, or don't need multi-tasking then live with your BBC micro a while longer. As for me, I'm hooked.

*The Scorpion plus manual and serial link costs £249.95 plus VAT and the the Beasty Sensor Pack retails at £34.74 plus VAT. The price of Servos starts from £14 plus VAT. Scorpion was designed by Micro-Robotics of Cambridge, and is distributed by Commotion, 241 Green Street, Enfield EN3 7SJ, Tel: 01-784 1378), whom I thank for their kind assistance with this review.*

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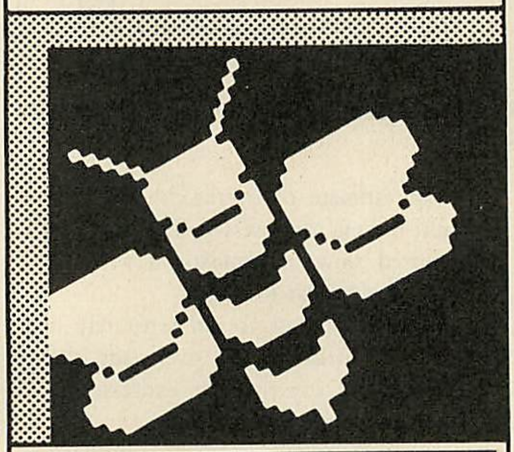
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In a comparison with ADE, MACROM was able to assemble a program to disc in 1 min 24 secs compared to 5 minutes with ADE and the source code took up 30% less room on the disc.

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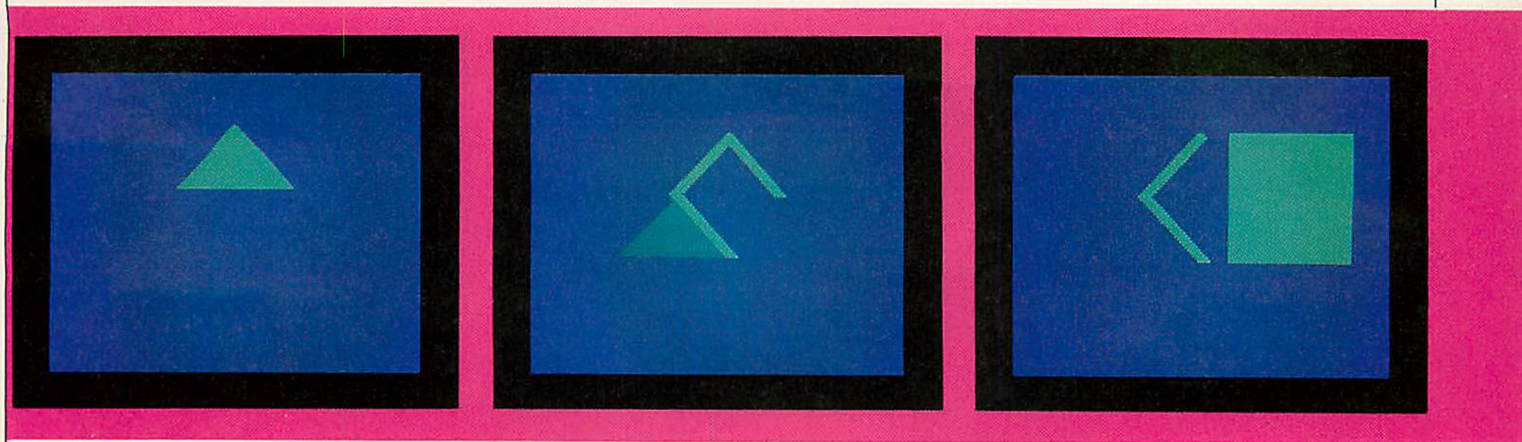
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# BIG, BRIGHT AND BEAUTIFUL

**By using only simple triangles and squares, children can build up complex pictures with *Kiddie Art***

*John C. King*

Watching a group of five and six year olds paint, it was evident they enjoyed creating bold, bright and colourful patterns and pictures. The *Kiddie Art* program presented here gives young children the opportunity to do this with a computer graphics package. Instead of the more usual system which creates the pictures through drawing by moving lines, this program moves areas of colour around the screen.

To keep the program straightforward, just two shapes are used, a square and a triangle, and only one can be activated at a time. When the user is happy with the colour, size and position of the shape it is fixed to the background. This way the screen can be quickly and easily filled with colourful patterns and pictures to give children a sense of achievement and fun. In the hands of older children and adults quite complicated pictures can also be built up and constructed with the program.

The *Kiddie Art* program can be used in several different ways. A teacher could talk about translating the shape across the screen, introducing an idea children for-



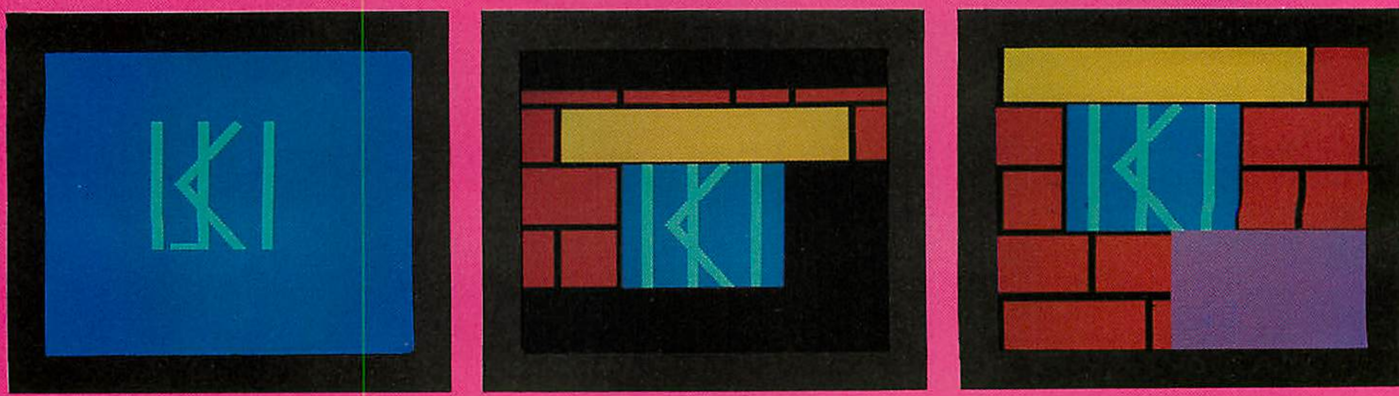
**The electronic portion of this image was created by Jonathan Inglis using the *Kiddie Art* program**

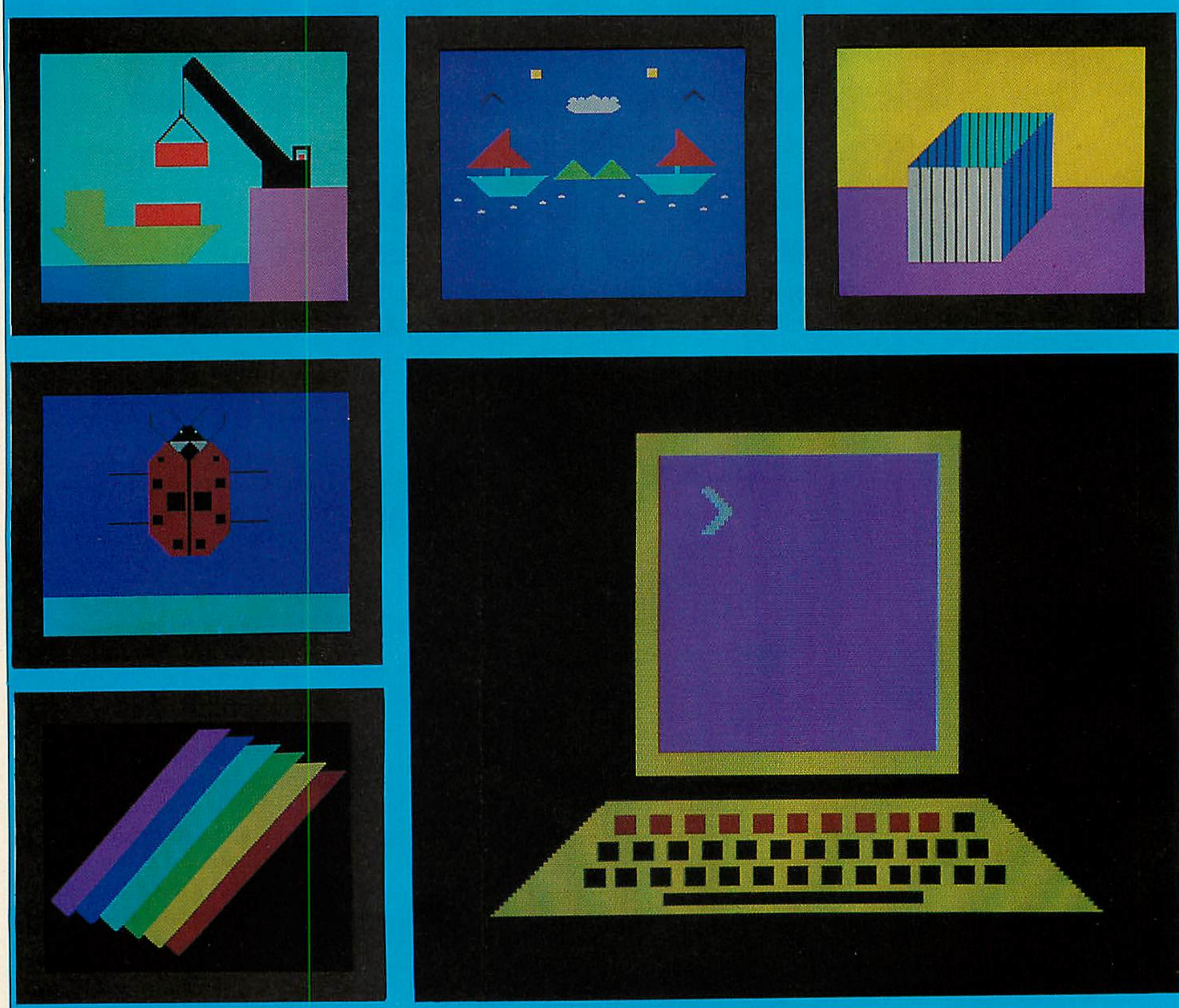
malise later. Overlapping the squares and triangles shows how irregular areas can be built up from simple ones. Problems can be set, such as reproducing a previously constructed picture. Some people may also like to set themselves tasks.

The data file program (listing 4 on the yellow pages) creates a picture file, called 'Break' when run, which can be loaded into *Kiddie Art* or can be displayed using listing 3. This picture will be referred to when describing how to use *Kiddie Art*. As listing 4 contains a large amount of data the program gives checksums for each batch of 12 lines to eliminate errors.

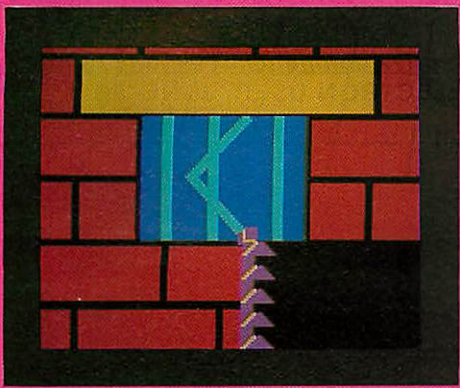
The gallery program (listing 3) contains a procedure, PROCdisplay, which can be used in your own programs to display a picture created and stored by *Kiddie Art*. The programs using the procedure must be in mode 2. By adding extra data lines between lines 160 and 220, each containing the name of a picture file, a gallery of your own pictures can be displayed. Tape users should delete the delay line 110.

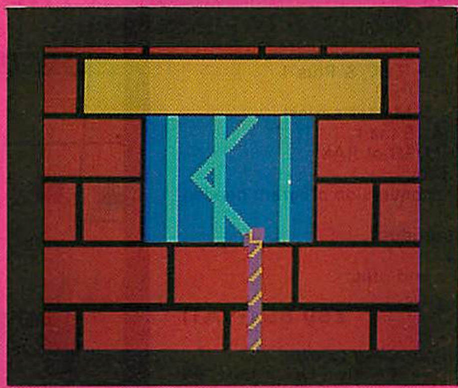
The *Kiddie Art* program is split into two parts, the first is a small loader program which should be saved as Images, the





The pictures of the crane, ship, box, ladybird, rainbow and computer illustrate the versatility of a program which uses just two simple shapes to create the images. All ages are fascinated by it





second is the main program and should be saved as IM1. The loader program sets up values for the main program.

Since the program is designed for young children some protection is built in. Line 90 ensures that if the Break key is pressed the program re-runs and the method of data storage ensures pictures are not lost. However, the currently active shape will be lost and so a new one will have to be chosen. On pressing Escape the user will be given an opportunity to quit or continue. Provided the default page values are being used, typing OLD and RUN after a CTRL-Break should restore your picture, but note you will not be able to do this on any system that defaults to a page higher than &1900.

## Running the program

The program runs by executing the loader program with CHAIN"IMAGES". A title page then appears on screen; press any key to start. A blank screen is presented; press either function key f0 for a square or f1 for a triangle. Pressing either of these keys at any time gives you a new currently active shape, fixing the previous shape to the background. The active shape may be moved round the screen using either the function keys f2 to f5 or the cursor keys. Colour can be changed using f6, size can be altered with f7 making the shape larger or with f8 to make it smaller.

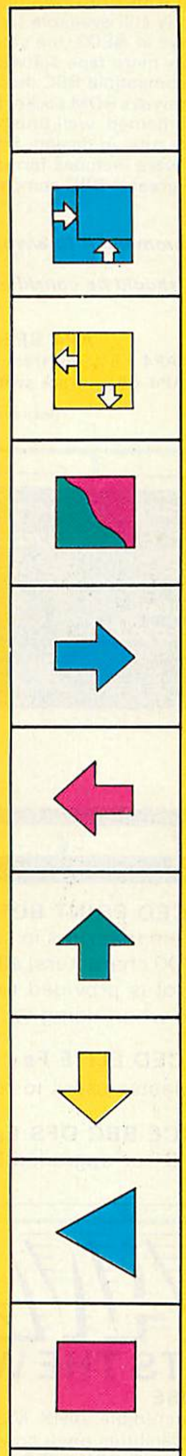
Mistakes in creating a picture can be corrected by covering them with a currently active shape and changing the colour of the shape to the same colour as the background. The whole screen can be cleared by pressing f0 for a square and holding the f7 key down until the square covers the entire area. You can then change the colour of the square to black or any other colour you want.

This is also a useful technique for creating a background. If you want to create a beach scene, press f0 for a square, enlarge it to fill the whole screen and change its colour to cyan. Use f0 once more for a second square, enlarge it to fill the screen again, change its colour to blue and then move it down so about one third of the screen is cyan. Repeat this a third time with a yellow square moved down to the bottom third of the screen.

The order you create parts of the scene is important. If you try to compose the beach scene by first using a large cyan square followed by a large yellow square, the blue sea would have to be put in by joining several smaller blue squares across the centre. This would take up more shapes and time. It is simpler to create a red line across the screen by partly overlapping a large red rectangle with a large black rectangle than by positioning many small red squares. Take care to create this line before creating any detail in the picture.

Both methods were used to creating the 'Break' picture (see top panel of pages 87, 88 and 89). The bars and the window were created first as they involved the use of thin lines. Starting with a blue background the bent bar was made by overlapping cyan triangles with blue triangles. A cyan triangle, slightly enlarged was positioned to make the top of the bent bar. A second triangle, of the same size, was placed over the top of this and then moved a little way to the right, and its colour was then charged to blue. The lower part of the bent bar was composed in a similar way but the second triangle was moved to the left. All vertical bars in the window were put in using this technique; overlapping cyan squares with blue ones.

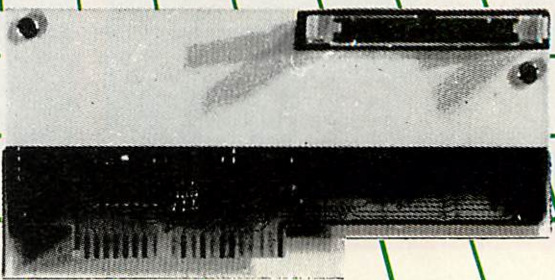
The bar cutting across the curved one used three pairs of smaller cyan and blue squares. Care was taken over which side to make the overlap so as not to wipe out previous parts of the window. The lintel was built up by overlapping a yellow



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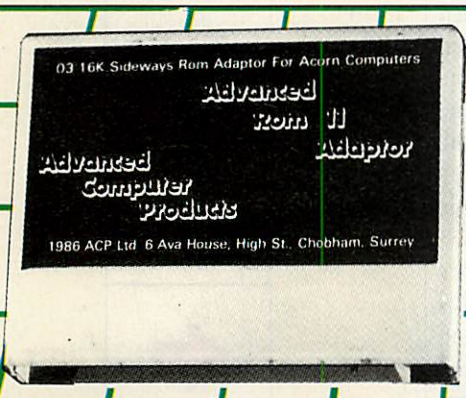
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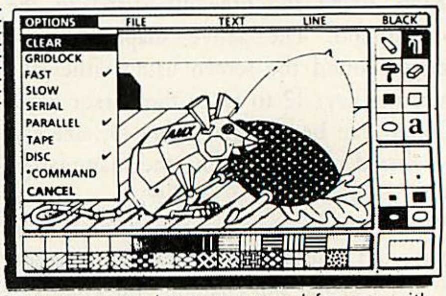
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square with a black one above it. The bricks were put in next, leaving the bottom right-hand corner of the picture blank for the rope. The existence of the window meant the bricks could not be made using the overlapping method and so were built up with pairs of adjoining red squares. The rope, however, was created with the overlapping technique.

The picture can be saved at any time by pressing 'S' and you will be asked if you wish to save it to tape or disc. Make your choice and enter a filename and press Return. If something goes wrong at this stage an error will be reported, and pressing any key should restore your picture allowing you to check what may be wrong and try again. When your picture is saved the currently active shape will be fixed to the background. To load a previously saved picture press 'L', select tape or disc and enter the file name.

When the currently active shape is fixed, the size, position of the bottom left-hand corner, colour and type of shape are stored in memory. As the program is in mode 2 and memory is at a premium, this data is compacted into five bytes and stored directly into memory rather than using an array. This does make the program more complicated to follow but allows up to 200 shapes to be stored in the memory.

When you approach the memory limit, a warning is given with a sequence of bleeps. The first bleep sounds when there are 15 shapes left, the second when there are 10 shapes left and a bleep of a different tone when there are only five shapes left. After 200 shapes have been stored you can continue to create pictures but no further shape can be saved.

The whole screen can be quickly deleted, or, more accurately, obliterated. Choose a square and without moving it at all, hold your finger on function key f7, until the square fills the screen. But note that all previous shapes will still occupy memory, so starting again is usually better.

## Storage details

Details of the picture are stored, in sequence, in memory, the first item being the number of shapes used so far. HIMEM has been moved down to accommodate this data store. The data is kept in blocks of five bytes. The first three contain the X and Y co-ordinates of the bottom left-hand corner of a shape, the next contains the size of the shape and the remaining byte contains the colour and type of the shape. It will be less than 128 for a square and equal to or more than 128 for a triangle. Storing the data in this way ensures recovery after the Break key is pressed. Compacting is the only way to squeeze it into the available mode 2 memory space. It also means that several picture files can be stored on the same disc as less than 1k of storage space is required to achieve this.

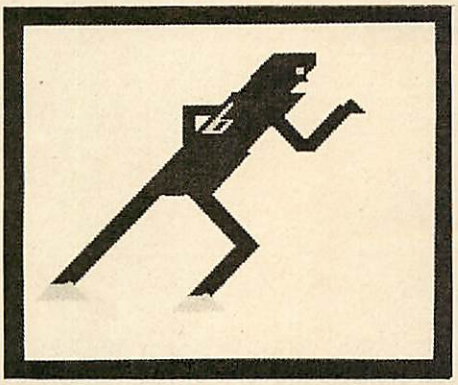
## In use

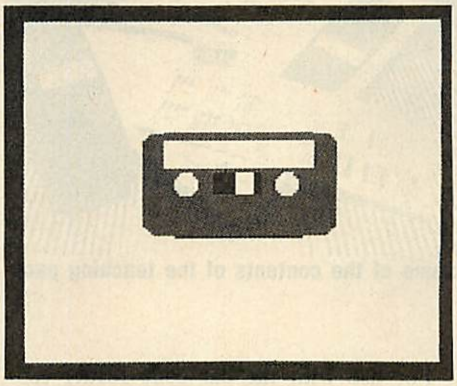
The program was used by several young children who all enjoyed using it. A disappointment was no available colour printer to print out the results. But this produced further creativity as many used their *Kiddie Art* pictures as a basis for drawings, collages and paintings.

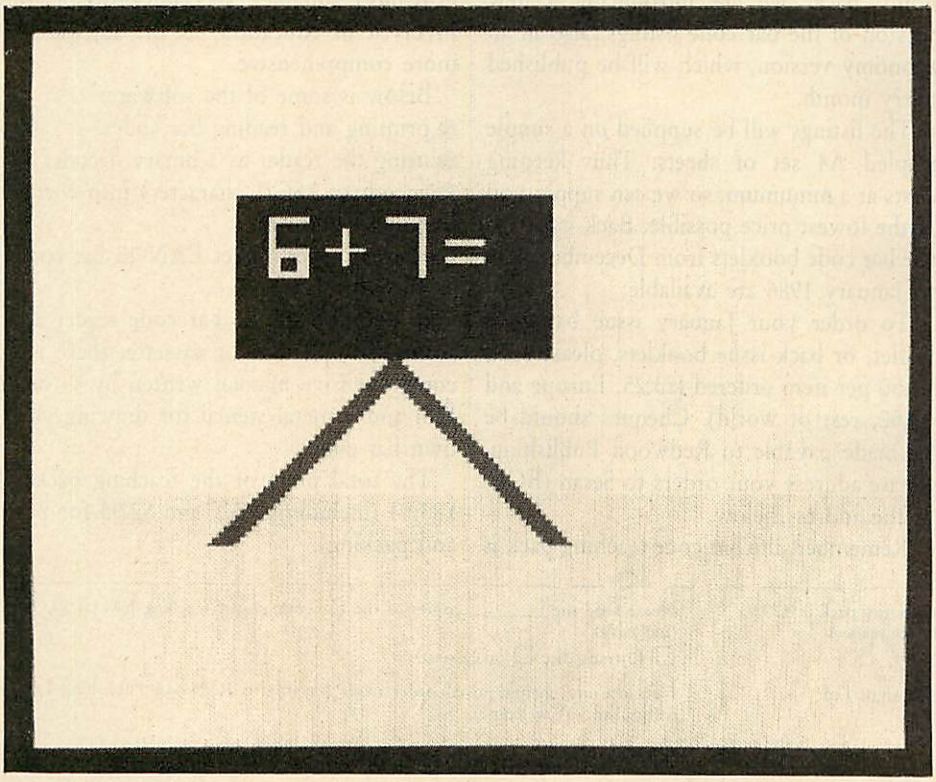
Most children where surprised at what could be achieved and became more adventurous and creative as they became experienced with the program.

*Turn to the yellow pages index on page 113 for details of the Images program.*

*The function key stip on page 89 should be cut out and stuck on to the computer using small pieces of Blu-Tak. The key stip has a square and a triangle and four direction keys, illustrated using arrows. A colour change key is shown plus a key to reduce the shape size and another to increase it.*








**Using the image program, people and even numbers and letters can be created as seen in the pictures of the running athlete and the school blackboard above**

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# KEEP TRACK

**For disc users who don't remember exactly where they've saved what – and that's most of us – here's a handy disc indexing program**

*John Weller*

Have you ever had problems remembering just which disc you stored an important utility program on, or which of your many wordprocessor discs has that letter you wrote to the Gas Board last year? If you have, then you need an index of your discs and that is exactly what this program will do. All it requires, apart from a BBC B micro and a disc drive, is that your discs have been suitably titled using the *TITLE command and that the label on each disc carries the same title.

When the program is run it asks you which drive you wish to use to read the discs; either drive 0 or drive 1 can be used. It then asks if you have a data file to load; for the time being the reply should be N. Type in a suitable name for the index when requested – the name should not be more than seven characters long. If the index is saved on disc it will be used as the filename. You will be instructed to insert a disc, so insert a disc to be indexed into the drive selected and press f0.

The title of each side of the disc will be displayed and you will be asked to put in another disc. After all of the discs have been indexed, press f7 when 'Put in a disc' appears. If you want an index in alphabetical order, answer Y to the next question. Your index will be sorted in ASCII order of file names, ignoring the directory character. A menu of output options will be offered.

The program will work on any disc formatted to the 'legal' Acorn standard, a catalogue of up to 31 files held in sectors 0 and 1 of track 0. In addition it has been designed to cope with such things as a double-size catalogue created using Watford Electronics' DFS Large Catalogue facility and the special *SWAP double catalogue format offered by *Disc Doctor* and *Enigma*. It has been tested successfully with the Acorn 0.90 DFS, Watford's 1.30 and 1.43 disc filing systems (DFS), the Amcom DFS (in Acorn mode only) and the Opus Challenger 3 (in single density mode). As it relies on the OSWORD &F7 call it should work with any disc filing system (single or double density) that uses an 8271 floppy disc controller (FDC) or a 1770 with a good 8271 emulation.

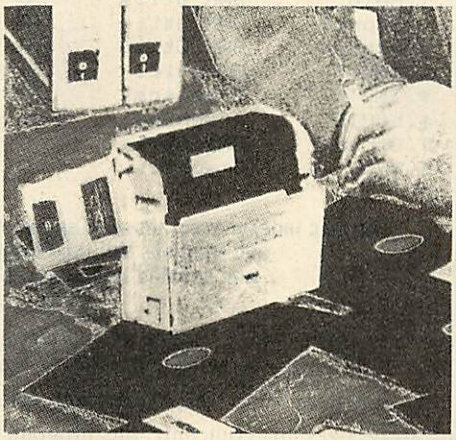


ILLUSTRATION BY SIMON EDWARDS

**All it requires is that your discs have been suitably titled using the TITLE command**

## Entering and testing

As with any of the programs in *Acorn User*, the easiest way to enter the program is to buy the listings cassette or disc. Alternatively, a suitable person may be bribed or coerced into typing the listings in for you. If those options fail, you are left with having to type it in yourself! Particular care should be taken with the apostrophes (Shifted 7) used to send a line feed to give blank lines for spacing.

When the listing (on the yellow pages) has been typed in and checked for typing errors it should be saved to disc before being run. Rather than risk using a disc containing valuable programs or data, a test disc should be prepared by formatting it in the standard Acorn 31 file format (if it is not already formatted to that standard). For double-sided drives, format both sides. Give each side a title and save several small programs to each side then re-load the indexer and run it. It should behave as described above – if it does not then you must have made a typing error.

When the program produces an accurate index of your test discs to the screen using option 1, you can try the other output options to confirm that they work satisfactorily. If you regularly use one of the other types of disc formats that the indexer is designed to work with, you should reformat your test discs in that particular format and check that your version of the program works correctly with them. Finally, test the program on some actual discs.

## How the program works

In the program, PROCinit dimensions and initialises a set of three arrays. The first holds the filename, the second, a pointer to the corresponding disc title and the side of the disc the particular file is on. A further array is dimensioned to hold the actual disc titles. If a data file is to be loaded, it is read in from disc by PROCreaddata and stored in the arrays. Otherwise it is assumed that a fresh index is required and the index name must be input via FNindname.

Each disc to be indexed is read by PROCreaddisc and the first two sectors of track 0 are loaded into pages &9 and &A. The sectors are loaded by PROCloadcat using the OSWORD call with &7F pointing to a parameter block held in memory locations &80 to &89.

The disc title is held on the disc in bytes 0-7 of sector 0 and bytes 0-3 of sector 1. PROCtitle transfers these bytes from the equivalent locations in pages &9 and &A to memory locations &100 to &10B and replaces any non-ACSII codes, such as teletext colour codes, by spaces. PROCreadcat uses PROCfile to extract each filename from page &9. The byte containing the directory character is ANDed with &7F to recover the ASCII code of the

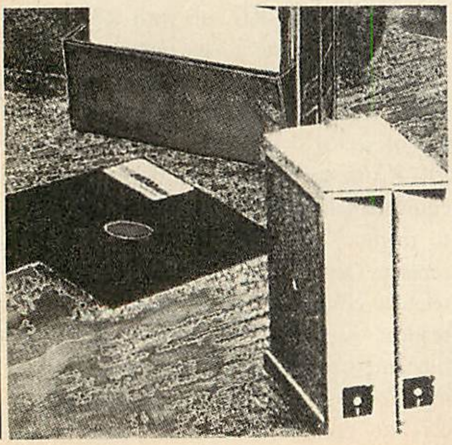
character from locked files which have their MSB set to 1.

Certain utility ROMs, such as *Disc Doctor* and *Enigma*, format discs in a special way to have dual catalogues on disc. The second catalogue is held in sectors 2 and 3 and the catalogues exchanged by *SWAP. The presence of such a format is indicated by a file with the name !.!!!!!!!.

PROCreadcat looks for such a file and if found sets a flag, swap%, to be true, then ignores the file. The Watford DFS's Large Catalogue facility uses sectors 2 and 3 to hold an extension to the catalogue, increasing the maximum number of files to 62. When the disc is formatted in this way, the first eight bytes of sector 2 are set to &AA. PROCreaddisc loads sectors 2 and 3 into pages &9 and &A, overwriting the original catalogue, and checks for a Watford large catalogue. If one is found, another flag, largecat%, is set to true. If swap% is true, the second catalogue is treated as a new disc, the title is read and stored and the files added to the index. However, if largecat% is true the file names are merely read and added to the index using the original title of the disc. This process is then repeated for the other side of the disc. The index now consists of the three related arrays referred to above which can be sorted by PROCsort.

The arrays which store the index will handle up to 40 sides or 600 filenames, whichever comes first. These values (maxdiscs% and maxentries%) were selected on the assumption that PAGE is set to &1900 and on average discs would be half-full on each side. If you require a different sized index, either or both of these values can be changed. However, space may have to be made for any increase in array sizes by crunching the program using one of the utilities available or setting PAGE to a lower value. Space must be left for one file to be open ie, PAGE>=&1200 for a standard disc system.

**The program will work on any disc formatted to the 'legal' Acorn standard**



| | | | | | |
|---|---|---|---|---|---|
| $.!BOOT | SWR Utils | 0 | $.PROP | Graphics | 0 |
| $.!Boot | Graphics | 0 | $.QSVPIC | Graphics | 0 |
| $.!MENU | SWR Utils | 0 | $.RCLEAR | SWR Utils | 0 |
| $.7EDIT | Graphics | 0 | $.RLOAD | SWR Utils | 0 |
| $.BCOPY | Graphics | 0 | $.RLOOK | SWR Utils | 0 |
| $.BMOVE | Graphics | 0 | $.ROMS | SWR Utils | 0 |
| $.BOTBIT | SWR Utils | 0 | $.ROTATE | Graphics | 0 |
| $.BOXLOAD | Graphics | 0 | $.RSAVE | SWR Utils | 0 |
| $.BOXSAVE | Graphics | 0 | $.Rampad | SWR Utils | 0 |
| $.BSWAP | Graphics | 0 | T.Rampad | SWR Utils | 0 |
| $.Buffer | SWR Utils | 0 | $.Rhead1 | SWR Utils | 0 |
| T.Buffer | SWR Utils | 0 | $.Romhead | SWR Utils | 0 |
| $.CHCOL | Graphics | 0 | T.Romhead | SWR Utils | 0 |
| $.COLFILL | Graphics | 0 | $.Romfile | SWR Utils | 0 |
| $.CONV10 | Graphics | 0 | T.Romfile | SWR Utils | 0 |
| $.CONV20 | Graphics | 0 | $.SCREEN1 | Graphics | 0 |
| $.CONV21 | Graphics | 0 | $.SCREEN2 | Graphics | 0 |
| $.COPY40 | Graphics | 0 | $.SVPIC | Graphics | 0 |
| $.Copy40 | SWR Utils | 0 | $.SWAPCOL | Graphics | 0 |
| T.Font | SWR Utils | 0 | $.Swap | SWR Utils | 0 |
| $.Font | SWR Utils | 0 | T.Swap | SWR Utils | 0 |
| $.HEAD | Graphics | 0 | $.TINSTR | Graphics | 0 |
| $.HEAD | SWR Utils | 0 | $.TOPBIT | SWR Utils | 0 |
| $.HINSTR | Graphics | 0 | $.UDEMO | Graphics | 0 |
| T.Help | SWR Utils | 0 | $.UINSTR | Graphics | 0 |
| $.Hlprom | SWR Utils | 0 | T.Windows | SWR Utils | 0 |
| T.Hlprom | SWR Utils | 0 | $.Windows | SWR Utils | 0 |
| $.INDEX | Graphics | 0 | $.WiP | Graphics | 0 |
| $.INSTR | Graphics | 0 | $.YFLIP | Graphics | 0 |
| $.LDPIC | Graphics | 0 | $.UINSTR | Graphics | 0 |
| T.Other | SWR Utils | 0 | T.Windows | SWR Utils | 0 |
| $.PROC | Graphics | 0 | $.Windows | SWR Utils | 0 |
| | | | $.Window | SWR Utils | 0 |

**The disc indexer program used on two *Acorn User* discs (Sideways RAM Utilities and Graphics Utilities) followed by an alphabetical sort, and spooled into a text or wordprocessor for printing.**

## Output options

Four output options are offered. Option 1 is output to screen, option 2 is hard copy to a printer. For a spooled file choose option 3 and option 4 is for a data file. Option 1 clears the screen with VDU12, sets page mode with VDU14 then prints the index to the screen with PROCscreen. Option 2 uses PROCprint to turn the printer on and page mode off then calls PROCscreen so that the index is sent to the printer as well as the screen.

Option 3 works in a similar manner except that the index is sent to the disc instead of the printer. PROCspool opens up a spooled file with PROCoscli using the index name as a file name giving it the directory letter S to indicate that it is spooled. Option 4 creates a data file using PROCwritedata to open a file using the directory letter D, coupled with the index name. The number of discs in the index (discs%) and the number of entries in the index (entry%) are saved, followed by the contents of the arrays.

If an error occurs, eg, attempting to spool a file to a write-protected or full disc, PROCerror closes any files which may be open. The printer disables and returns to the output menu so the error can be corrected and another attempt made. The program treats Escape as an error so the program must be left via the output menu option 5. Option 5 is confirmed by FNfin, in case it is selected accidentally.

The different types of output can be used in a variety of ways. The main use of option 1 will be to check the index prior to using option 2 to create a hard copy as a permanent record. If you classify your discs into groups, eg, games, music, letters and so on, you may wish to have an index of the group spooled on to one of the discs of the group using option 3. The index can then be called up by a !Boot file using VDU 14 and *TYPE INDEX.

The data file option, option 4, is mainly used to enable an index to be expanded to include more discs. If an index has been saved as a data file it can be re-loaded by replying 'Y' to the initial question, do you have a data file to load? You will be asked for the filename, the file will be loaded into the arrays and you will be able to continue by inserting the new discs, saving the new

index as a data file when the extra discs have been added.

The program is written to work on a dual double-sided system. The amendments required to the program for other configurations are as follows:
**Single Drive Single Side:** delete lines 660 to 710,1050,1190,1240,3100 and add line 335 ?&80=0
**Single Drive Double Side:** delete lines 660 to 710 and 3100, add line 710 drive%=0
**Double Drive Single Side:** delete lines 1050 and 1190 and add line 1240 ?&80=drive%



## Functions

**indnam** – inputs index name
**fin** – confirms deliberate selection of option 5

## Procedures

**init** – initialises arrays and OSWORD parameter block
**start** – prints instructions
**readdisc** – reads the file names from a disc
**sort** – sorts index into ASCII order of file name
**output** – offers the output options
**readdata** – reads data file in from disc
**loadcat** – loads disc catalogue to memory
**title(X%)** – extracts disc title
**readcat** – stores file names from catalogue in arrays
**file(X%)** – extracts file names
**screen** – prints index on screen
**print** – sends index to printer
**spool** – spools index to disc
**writedata** – writes index to disc as a data file
**swapcat** – reads title of second catalogue if in *SWAP format
**oscli(A$)** – passes a string to the command line interpreter
**double(A$)** – prints in double height
**error** – error handling routine

## Variables

**indexname$** – index name
**g%** – general purpose GET variable
**dummyfiles$** – dummy file name
**dummysides$** – dummy side
**dummytitles$** – dummy disc title
**sector%** – disc sector to be read
**disc%** – number of discs so far
**entry%** – number of file names so far
**maxdiscs%** – maximum number of discs that can be indexed
**maxentries%** – maximum number of names that can be stored
**disctitles$()** – array of disc titles
**file$()** – array of filenames
**name%** – array of pointers to disc titles
**side$** – array of disc sides
**line%** – oscli parameter block
**X%** – formal parameter in procedure declaration
**A$** – general purpose string variable
**A%** – general purpose loop control variable
**C%** – loop control variable used in sort routine
**indfilname$** – file name used to store index as data file
**currdrive%** – control variable used in reading disc sectors
**drive%** – drive to be used for reading discs
**swap%** – *Disc Doctor/Enigma* special format flag
**largecat%** – Watford Electronics DFS large catalogue flag
**temp$** – temporary variable used in sorting
**char%** – temporary variable used in cleaning up disc title
**dir%** – directory byte
**filename$** – file name
**end%** – end flag
**spoolname$** – name for spooling index

*Turn to the yellow pages index on page 113 for the disc indexer listings.*

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# CALLING ALL COMPUTERS

**The RS232 interface and a modem turn the Compact into a powerful communicating machine**

*David Atherton*

The crystal ball gazers predicted a boom market in add-ons for the Compact and one of the first is the RS232 serial interface upgrade from Acorn. It consists of a set of chips which allows the serial port (the one marked RS232) on the back of a Compact to transmit and receive information. With this RS232 interface, many add-ons can be connected to the Compact, including modems and special purpose printers. In addition, the RS232 provides a simple method of transferring files from BBC micro 5.25in disc systems.

We have also written some software which will transfer files if you have an RS232 interface. If you haven't got a Compact, keep on reading, as most of the article applies to BBC micro and Master owners who have a serial interface as standard.

Don't worry about the name RS423 on the BBC micro system and RS232 on the Compact. The two systems are identical for all practical purposes. The differences are concerned with signal strengths when very long cables are being used.

On opening the plain brown box, the Compact interface upgrade is not very exciting to look at. Four chips are provided with a brief sheet showing how to install them. The installation is easy, just unscrew the case, plug the four chips into the sockets as indicated on the sheet and screw the casing back on. A short test listing on the sheet checks the installation is correct and works. The external socket is already provided. The software to drive the interface is provided in the machine operating system (MOS), so no extra discs or ROM chips are needed. So, having fitted the interface, what can you do with it?

By far the most popular home use of a serial interface is for communications. For this you also need a modem which plugs into your serial interface socket and to the telephone line. You can then connect your computer to other computers by calling them on the telephone. The modem converts computer signals to audio tones for the telephone lines, and a modem at the other end converts them back. If a remote computer is set up for receiving calls, it will have an automatic answering system. When it answers you press a switch on your modem and your screen will show the information the remote computer is transmitting. Anything you type will be sent to the receiving computer.

There are two types of remote computer systems, amateur systems which are usually free and commercial systems for which you must pay a subscription. The free amateur systems are usually referred to as bulletin boards and there are about 200 in

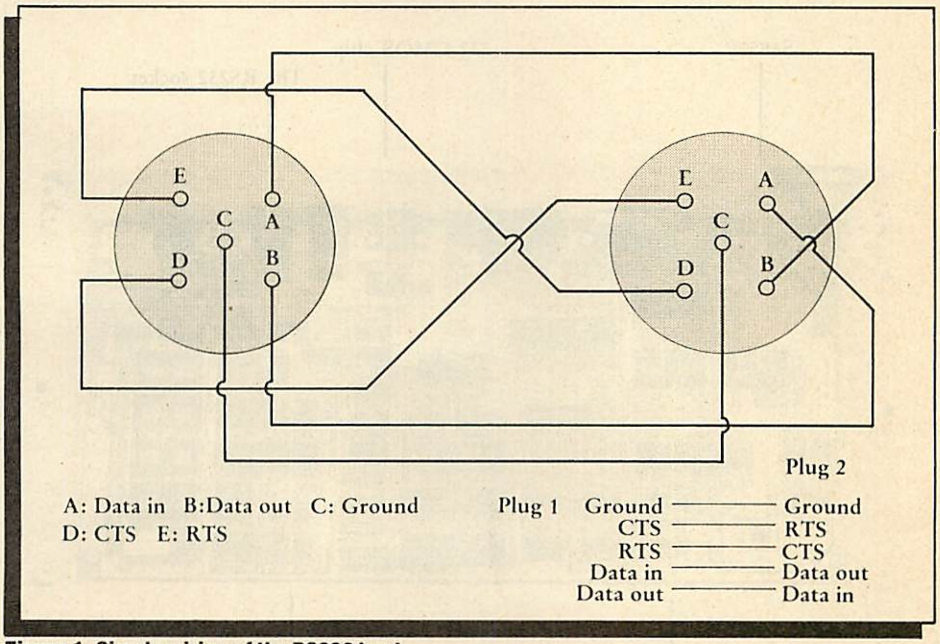



**Figure 1. Simple wiring of the RS232 lead**

## QUICK LISTING TRANSFER

If you want to transfer a Basic program which can be listed from one machine to another and you have the connecting cable, you can do the transfer without our listings. This is how:

1 Plug in cable between two machines
2 Set baud rates (Type *FX7,8 and *FX8,8 on both machines)
3 Type *BASIC followed by *FX2,1 on the receiving machine
4 Load in program, type *FX3,1 then LIST on sending machine
5 Type PRINT "*FX2":*FX3 on sending machine
6 Press Escape on both machines

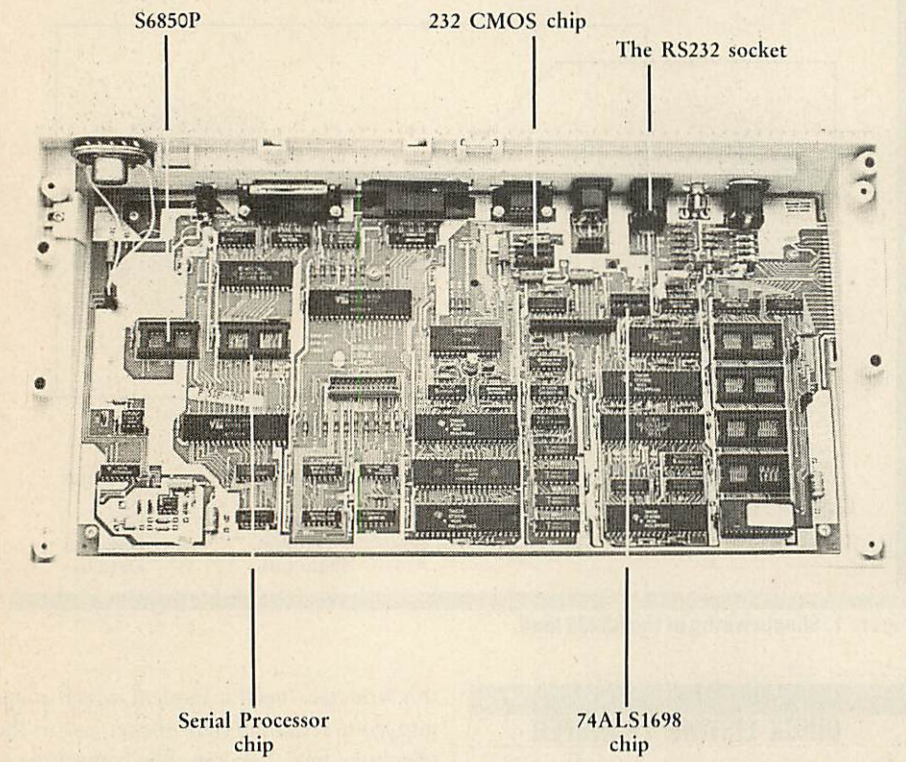
The receiving machine now contains the program as listed, which can be saved in the normal way.

the United Kingdom. They often contain hints and tips and other computer information and sometimes facts about other interests such as music, astronomy, community activities and so on. You can leave messages for other callers and pick up replies when you call again.

The only commercial system that is really of interest to the home user is Prestel, which contains a large section called Micronet 800 aimed at home computer users. Micronet are currently offering a free modem to subscribers (subscription is about £60 per year), which can be used to call bulletin boards as well. A modem costs between £25 and £250, depending on features. Prestel has a wide range of other areas including travel news, weather, finance and so on. The system is two way, opening the door to such delights as home shopping and banking, for example the Royal Bank of Scotland's Home and Office Banking System.

As well as a modem you will need some software in the Compact to display the data from the computer, and to send what you type in. There are two display standards known as scrolling (or ASCII), and Viewdata. The former gives a display similar to listing a program. There is no colour, only text which scrolls up the screen. Viewdata looks like the BBCs Ceefax service, using coloured screens with block graphics. Good communications software such as *Commstar, Commsoft, Modem Master* or the communications listings in the June 1986 issue of *Acorn User* provide both formats. You have to use the format which matches the remote computer. So Prestel, which uses Viewdata, will not display properly with scrolling software, and likewise scrolling bulletin boards will not give the right display with a Viewdata terminal program.

If you possess a modem and Viewdata software and would like to see what Prestel looks like, there is a special demonstration password (type 15 fours). The number is 618 from London telephones, and 061-618 1111 in Manchester. The demonstration section also contains a list of local call Prestel numbers. Some free bulletin board numbers can be found on the Noticeboard pages in past issues of *Acorn User*, or in the news section.




**When you buy your RS232 upgrade, this is where the four chips are inserted**

There are many other uses for a serial interface. Some older printers (such as the £29.95 thermal printer currently on sale at Dixons) only have a serial connection and are unsuitable for the Compact's 'printer' socket. These can be plugged into the RS232 socket, and a single command:

*FX5,2

redirects all printer output to the RS232 port. The correct baud rate must also be set. Probably the most common use of the RS232 standard is as a link to mini and mainframe computers. The Compact, with communications software, makes an excellent terminal to a mainframe computer, and is cheaper than many dedicated terminals, which don't have a disc drive.

The RS232 interface is often the only convenient way of driving plotters, image scanners, data-logging devices, videodisc players, home control systems and so on. This is because manufacturers of these devices need an interface which can connect to a wide variety of computers, and RS232 is the only one which can be found on almost every computer – it is one of the few compatibility standards which has been successful. So if you wish to transfer data directly between two different micros, RS232 is usually the best way to do it. For example you could send Amstrad 8256 text files to your Compact, or Compact *View* files to an IBM PC. This brings us to a practical application – getting files to the Compact from a BBC B micro, Master 128, or disc-based Electron.

Compact users may also have access to BBC B micro or Master 128 computer and so may wish to transfer software and files between the two. This can be difficult unless you go to the expense and trouble of getting both 5.25in and 3.5in drives on the same cable. Here is a neat low-cost solution for serial upgrade owners with which you can transfer files between any BBC computers. The system works between any two BBC micros which have serial interfaces, so it could also be used if you have, say, 3in drives on a BBC micro.

There are two listings on the yellow pages to type in, one is for transmitting, the other for receiving. If you type them both into your Compact, you can use the quick transfer method (see box) for getting one to the other machine.

They will need a serial cable between the two computers. This consists of a five-core wire, with a DIN plug on each end. They can be brought for a few pounds or made up in about five minutes from parts costing about a pound. You need two five-pin 'Domino' DIN plugs, and a length of low-current five core electrical cable (two metres is convenient). The plugs should be opened and the wires soldered in accordance with figure 1. This is a simple soldering job, and as you aren't touching any delicate components, it doesn't really matter if it takes you more than one attempt to make a soldered wire stick.

When the cable is ready, plug it between the two machines, using the serial sockets. The slot on the plug should be facing 'up' at both ends. Then load the transmit listing

## BAUD RATES

The Compact can send serial information at eight different speeds known as baud rates. The baud rate is the speed of serial data transmission. When data is sent along a line bit by bit, the speed of the transmission is what is known as the baud rate. The name derives from the French engineer, Baudot, who developed the teleprinter in the 1860's.

A 'baud' is equivalent to one bit per second. There are about 10 bits in a character transmission, so 1200 baud means about 120 characters a second. It doesn't matter which baud rate you use as long as the other RS232-based item is using the same speed. Except for telecommunications, where the rates tend to fixed, you may as well use the fastest reliable speed, 9600 baud. This is the speed at which the yellow page listings work. The eight rates are:

| Code | Rate |
|---|---|
| 1 | 75 baud |
| 2 | 150 baud |
| 3 | 300 baud |
| 4 | 1200 baud |
| 5 | 2400 baud |
| 6 | 4800 baud |
| 7 | 9600 baud |
| 8 | 19200 baud (not reliable) |

To select a particular rate for output type *FX8 followed by the correct code. Input speed is picked by *FX7. So to set up 1200 baud in and 75 baud out for say a modem, you would enter *FX8,1 and *FX7,4. The 75 rate is very slow; that used for old mechanical teleprinters. The highest rate, 19200 baud is very fast but not always reliable on BBC machines. The *Acorn User* terminal (June 86) has those codes. A joint in-and-out baud rate can be permanently set in the machine using the command *CONFIGURE BAUD followed by the code number.

## JARGON BOX

**Baud:** A measure of transmission speed. Each character sent along the serial interface becomes approximately 10 bits (ones and zeros), so 300 baud is roughly equivalent to 30 characters per second.

**Mainframe:** The name given to a large computer, usually multi-user, of the type that occupies several rooms and has banks of tape and disc drives.

**Mini:** A computer between a mainframe and a micro in size. Usually multi-user, occupying one room with a couple of tape and disc drives. Most of these are now being overtaken in power by micros!

**Modem:** A device which converts computer data into audio tones and vice-versa. This allows computers to connect to each other via the telephone network.

**MOS:** machine operating system. A large program permanently fitted to the computer which deals with screen displays, reading the keyboard, and other essential 'housekeeping' tasks.

**Prestel:** A British Telecom public database. Micronet is part of Prestel, run by a separate company.

**RS232:** This is the reference number of the document which defines this interface standard. RS423 is the name of a document which makes a higher specification. The standard is concerned with the voltage, current and duration of the electrical pulses. It is not concerned with socket sizes and shapes, or format of the data being transmitted. However, it does take error-checking into account.

**Serial:** This means that the computer information (data) is sent one binary digit (bit) after the other, needing only one wire, instead of the parallel system where eight wires carry all the bits in a byte simultaneously.

**Viewdata:** A standard or protocol for computer screen displays. Viewdata displays look like the BBC/ITV teletext system, or the BBC micro's mode 7.

into the computer from which you will be sending files and the receive listing into the other. So, if you are getting files for your Compact from a BBC micro 5.25in drive, the transmit listing would be in the BBC micro, and receiving listing in the Compact. Use the quick transfer method to put the right listings in the right machines.

Now start the software on each machine by typing RUN. It doesn't matter which one you do first. The transmitter software will ask for the name of the file to be transmitted. You can type the filename or any star command. After typing a filename, the rest of the process is automatic. The software will happily transfer any type of file, of any length. If you are transferring from the disc filing system (DFS) on the transmitter to the advanced disc filing system (ADFS) on the receiver, some filenames, such as those containing full stops, are not allowed by the ADFS. These will have to be renamed before transferring. Also, if you have a file called for example, X.LETTER, under the DFS, the transfer should be carried out by typing:

*CDIR X

then a filename of LETTER rather than including the full stop in the filename.

After transmission, the receiving computer screen will show it has finished and is waiting for another file and the transmitter will ask you again for a filename. Keep going until you have transferred all the files you need. To leave the program, press Escape (on both machines). Unfortunately, the program will only transfer cassette files from a Master 128, not a BBC B micro.

*RS232 serial upgrade, £29.90 including VAT from dealers or Acorn Computers, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (0223) 214411.*

*Micronet 800, 8 Herbal Hill, London EC1. Tel: 01-278 3143.*

*Prestel, ring 100 for Freephone Prestel.*

*Five-pin DIN plugs and cable from any good electronic/computer parts dealer. See the advertisements in this magazine.*

*David Atherton will make up the leads for £5 including post and packing. Send cheques or postal orders payable to David Atherton at 108 East Lane Wembley, Middlesex HA0 3NS.*

*CommSoft, £30 from SoftMachinery, 68 Botley Road, Oxford.*

*Commstar 2, £34 from Pace Micro Technology, Juniper View, Allerton Road, Bradford, West Yorkshire Tel: (0274) 488211.*

*Modem Master, £12.95 from BBC Soft, 35 Marylebone High St, London W1M 4AA. Tel: 01-927 4128.*

# RECURRING NIGHTMARES

**Following the introduction to the Castle of Nightmares game in last month's issue, we follow up with advice on playing and designing screens**

*Mark de Weger*

Some time ago I had a terrible nightmare. I was walking through an old castle. Suddenly I heard a noise, turned and saw a missile being fired. I ran for my life, over conveyors, disappearing platforms, desperately trying to avoid the horrors on the way. I just had to get the keys to open the door. Before I realised, I had landed in a computer game, the time elapsed, the alarm rang and I woke up.

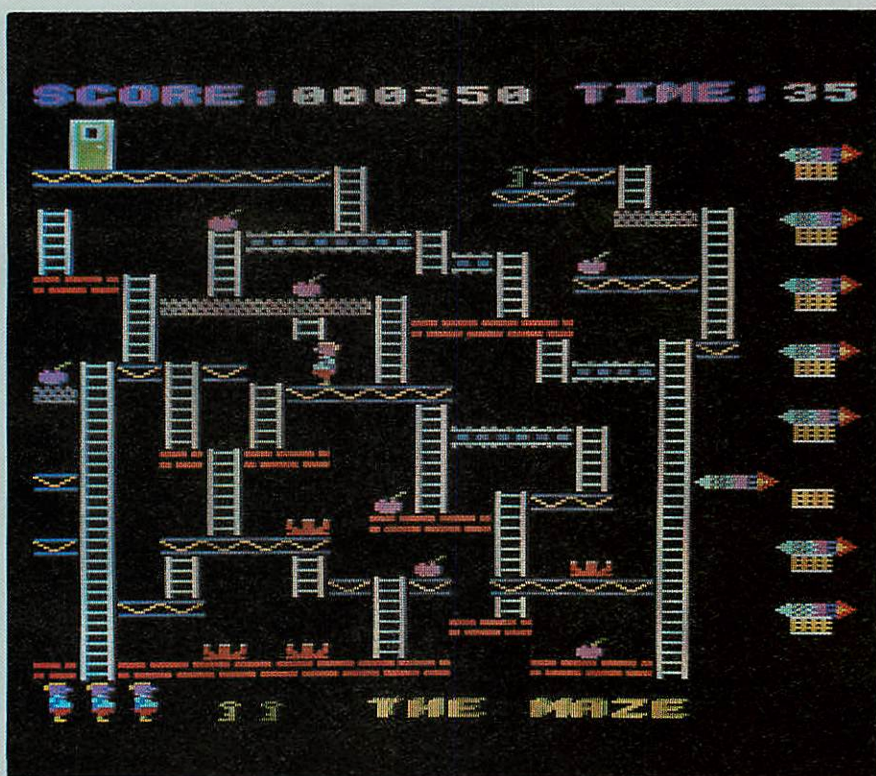
Of course you recognise the game, *Castle of Nightmares*, published in last month's *Acorn User*. It was probably one of the longest programs ever published in the magazine. Hopefully, it was worthwhile! The program allows screens to be created and these screens can be played in the game part of the program. To help you through the nightmare world, I'll give some hints on playing the game and designing screens. For the indestructable typists out there, there are five screens to be typed in.

## Play to win

If you played last month's game, you will now know quite a few tricks and here to help are some of my own.

For a quick completion of a screen, jump, as you move faster. Keep Return pressed when moving left or right to achieve this effect. This is not to be recommended to beginners, as it gives less control. Something you need to know for successful completion of screens is that to move right on a left moving conveyor, you need to jump. If you walk, you will just stand still and get nowhere.

To obtain a maximum score, players could be fooled into believing they must clear the whole screen not only of keys, but also of cherries and vibrating platforms







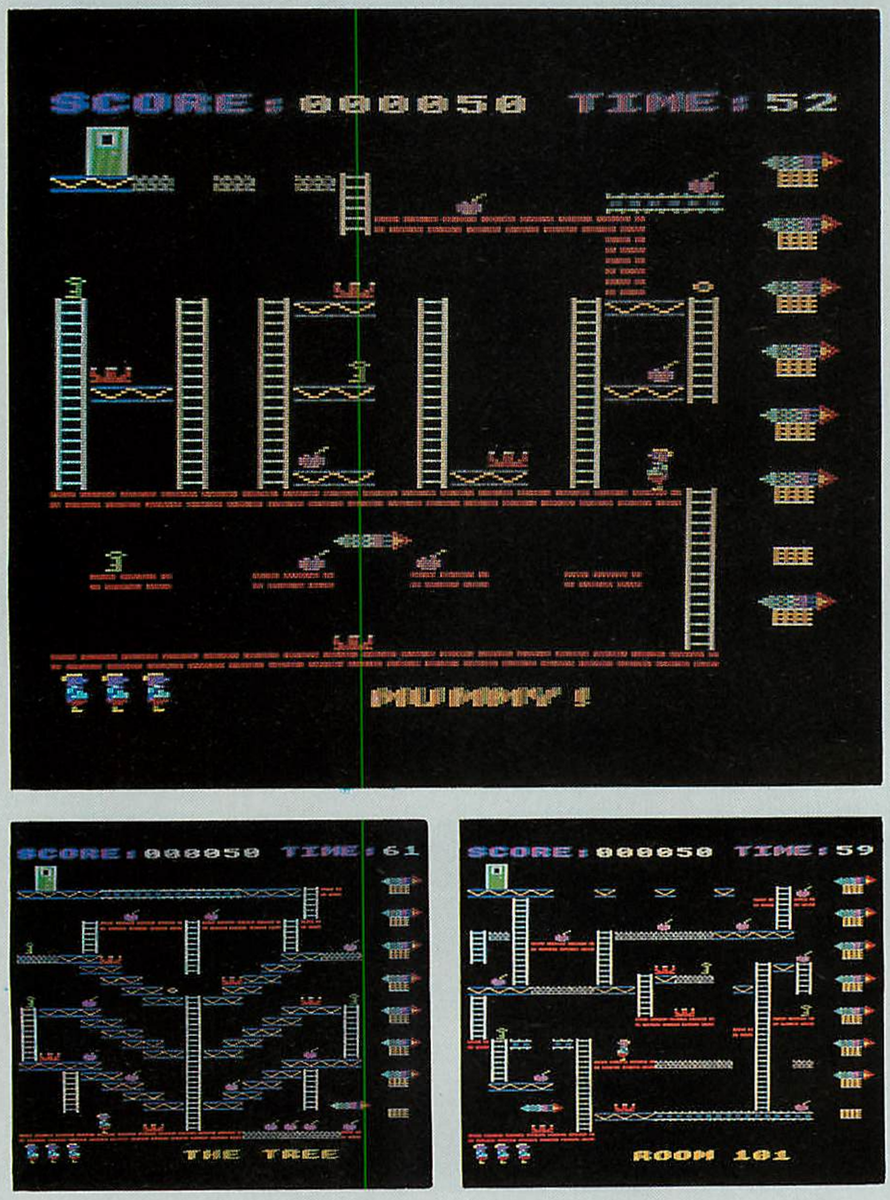
**The top screen illustrates an example of an average screen, challenging but not too difficult. The bottom screen, 'The Tower', can be a joy to design and to play**

as well. These players forget time is lost (and that's part of the score!) by picking up cherries. So only pick these up if you don't need to deviate too far from your key-hunting path. Otherwise the extra score from collecting cherries will not compensate for the time lost.

The vibrating platforms are a real hazard – they disappear when walked over. If a key is positioned at one end of such a platform, the trick is to reach it by jumping, instead of walking. This has two advantages, first, a cell of a vibrating platform will only disappear if you stand on it fully. If you stand half on one and half on another, you need not worry about falling as neither of the cells will disappear. The other advantage is when you jump over certain platforms, they don't disappear, making your way back easier! You can also stand for a little time on a cell of a vibrating platform before it disappears.

Some screen designers may like to put keys on cells of such vibrating platforms. The best way to pick up these keys is to press Z or X (depending on which way you need to go) and Return at the same time. As soon as you have jumped keep Return pressed, but now press the other direction key. This will ensure that as soon as you have landed and picked up the key, you will jump back.

Another hazard is the missiles. If one is shot at leg height, you can jump over it. If a missile tries to play head-hunter your best bet is to hide and quickly!




**The top screen is a joke, showing screen designer versatility. The 'Tree' screen below illustrates the variety of objects that can be created. The final screen is just well thought out**

## Designing screens

The screen editor was described in last month's article. The best screens are designed by giving your creativity free play. Start designing a screen without paying too much attention to any problems that may arise when playing. Remember not to put in too many hazards yet.

Then try to play the screen in the game part of the program and make notes of all problems that arise and of the easy passages. The next stage is to correct these problems and add obstacles using the screen editor. Repeat until you are content with the design.

It is a good idea to ask friends to give their opinions. They won't look at your work from the viewpoint of the programmer and they may come up with some excellent design suggestions.

Here are a few tips to help you in screen design and playing the game:

- In the game you need to collect three keys to open a door and go to the next screen. On difficult screens, it would be helpful for less experienced players to put in more than three keys giving a better chance to open the doors.
- The player can jump two cells so leave at least three blank cells between two platforms to prevent jumping over the hole and so making life more difficult.
- By placing cherries in rather inaccessible places, you give the experienced player the chance to gain extra points, whereas the beginner can simply ignore them. Remember collecting cherries can waste time and you loose points.
- Only place time pills on difficult screens, otherwise the screens become far too easy to play.
- The conveyors move the player when stood on. A nice effect can be obtained by placing a left and right-moving conveyor next to each other, causing the player to be jolted.
- The spikes kill the player if jumped on. One spike is easy to avoid, but a series of spikes, each separated by a blank cell, creates a tricky situation.
- You can make it difficult for the player to go back the same way, by placing a row of vibrating platforms on the screen. When the player walks over them, they disappear and so a new route has to be planned.
- The missiles at the right of the screen are fired at the player as it moves around the screen. To get the best effect out of these missiles, you should try not to place platforms at the same height as the missiles, but preferably one or two cells lower.

## The screens

To give you some first-hand experience in designing screens, I will now describe how the screens on these pages were created.

The first screen on page 103 is an example of one from an average platform game. Nothing stunning, but just enough hazards not to make life too easy. First, the main layout was created and most hazards were added after noticing which places were easy to pass.

The next screen, 'The Tower', was very easy to create. I had the idea of using a tower, but didn't know how to implement it. So I simply put the tower on screen. I then added some necessary ladders and platforms. I hardly had to modify this initial design. This screen is rather easy to complete, as it's possible to climb the tower by grabbing its stonework, and has the added advantage of making it easy to avoid missiles. Nobody is immortal, so I put a time pill on this screen.

The third screen, on page 104, is a joke. It shows just how flexible the editor can be. You should, however, take care with this kind of screen. This type of design is not usually very enjoyable to play! If you played the screen 'Acorn User' from the previous issue, you will understand why!

The 'Tree' screen is a good example of how a screen can be developed. Initially, I wanted to put a many-branched tree on screen. However, during play I didn't like the shape and design, so returned to the editor several times, until the current design evolved and I was satisfied. The final screen is a particular favourite. As with most well thought out computer games, there is a variety of ways to solve the puzzle. To make sure the player visits most of the places, I distributed the keys over the whole screen. Though it is enjoyable to play this type of screen, you should take care not to put too many in one game. as they tend to be fairly easy and can consequently, easily bore. Variety is the best remedy for weariness.

## The programs

As you will obviously adore the screens on these pages, I decided to give you the opportunity to create them very simply. Listing 1 on the yellow pages creates the five screens. After running the program, you will be asked which screen you wish to save, A to E. Press the appropriate key and the screen will be saved. There is a checksum routine for each screen's data, so mistakes can be easily rectified.

A normal *Castle of Nightmares* screen consists of 0.5k of data. This implies that for five screens you would have to type 2.5k of data. To save you from this fate, I devised a compression routine. Listing 1 contains the data in compacted form. It decompresses before saving.

Listing 2 on the yellow pages is the compression program which asks for a screen file name and then loads it. The program outputs the data in compressed form to a spool file. The compaction occurs in three stages. First, the screen is transformed from a 17 by 24 matrix to a 17 by 21 matrix. The 51 saved bytes all contain zeros, representing the missile locations which cannot be edited. In the second stage two bytes are reduced into a single byte. This is possible as the bytes only contain four-bit values (zero to 10) before compression. Finally, the program prints the data in four-byte values using the Basic '!' operator. The advantage of this method is that if four consecutive bytes all contain zeros, you only need to type one.

I hope these ideas have provided you with enough information to enable you to create your own professional-looking games. My high score on the five printed screens is 8520. However, the fun of *Castle of Nightmares* is you can make the screens as easy or as difficult as you want. So don't get too excited if your score exceeds one million! Sweet dreams.

*Turn to the Yellow Page index on page 113 to find the Castle of Nightmares listings and how to enter them.*

### PROGRAM NOTES

Listing 1 variables and procedures

| | |
|---|---|
| X% | pointer to OSCLI string |
| Y% | pointer to OSCLI string |
| addr% | pointer that gives address to byte to be decompressed |
| checksum% | checksum |
| loop% | loop counter |
| sum% | sum of data, compared with checksum% |
| x% | x-loop counter |
| y% | y-loop counter |
| buffer | OSCLI string buffer |
| OSCLI | address of MOS OSCLI routine |
| screen | number of screen to be saved |
| data$ | last item of data read |
| fn$ | file name |
| title$ | title of screen |
| PROCexpand | expands compressed data to normal COFNM screen data |
| PROCinit | initialises variables etc. |
| PROCOSCLI | Basic 2 OSCLI emulation |
| PROCpoke | reads data and pokes these into memory |
| PROCsave | saves screen |

Listing 2 variables and procedures

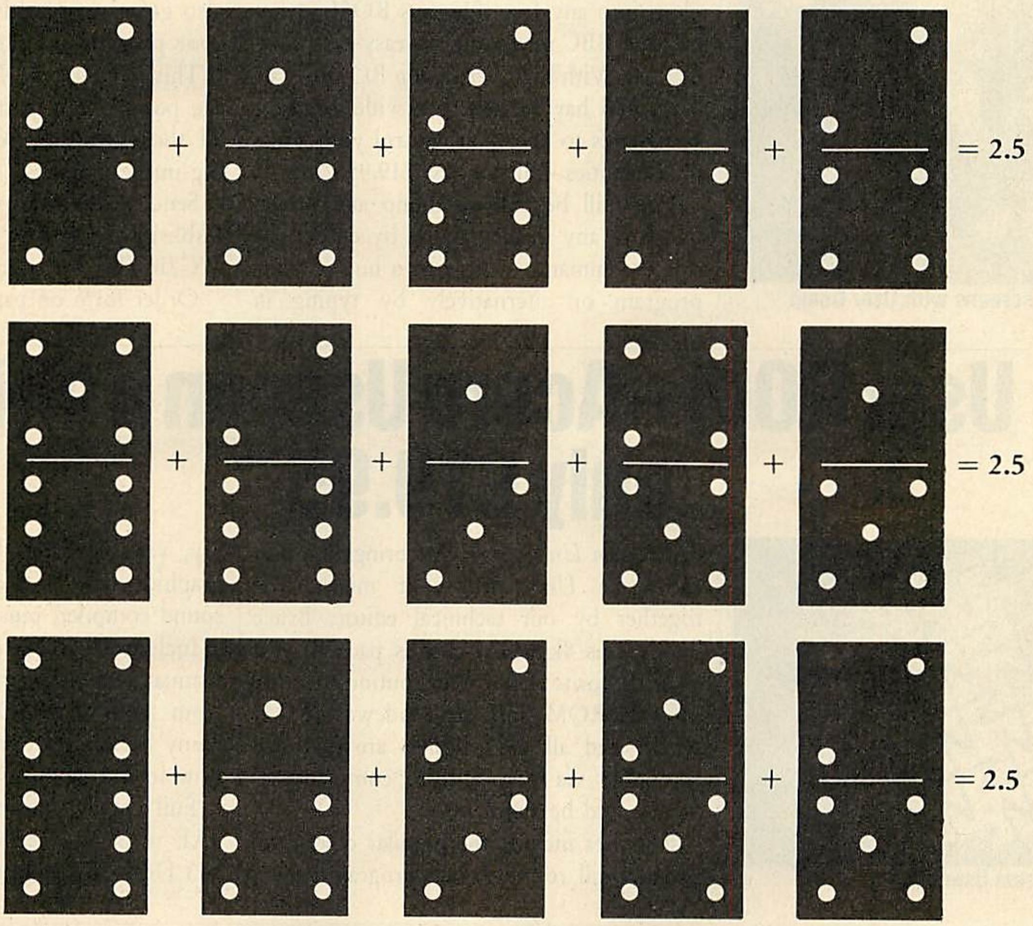
| | |
|---|---|
| X% | pointer to OSCLI string |
| Y% | pointer to OSCLI string |
| addr% | pointer that gives address of byte to be crunched |
| ln% | line number (when outputting data) |
| loop% | loop counter |
| sum% | sum of data, used as checksum |
| x% | x-loop counter |
| y% | y-loop counter |
| buffer | OSCLI string buffer |
| OSCLI | address of MOS OSCLI routine |
| fn$ | file name |
| PROCcrunch | crunches screen data |
| PROCinit | initialises variables etc. |
| PROCOSCLI | Basic 2 OSCLI emulation |
| PROCsave | outputs data to spool file |

# COMPETITION

## DOMINATION FOR SOFTWARE

**Rearrange the dominoes for this month's prizes of programming software and an art with mouse pack.**

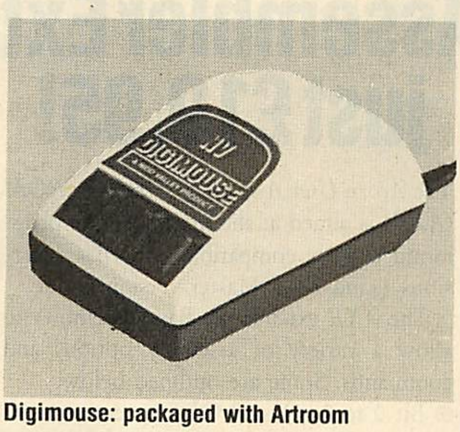
*Simon Dally*




This month's problem is another domino puzzle. If you remove the blanks from a standard set of dominoes you are left with 15, as shown in the diagram. If you treat each domino as a fraction and sum the fractions in each row, you can see that, as currently arranged, each row totals 2.5.

Your task is to rearrange the tiles in the same format, but this time ensuring that each of the three rows sums to 10. You are allowed to use 'improper' fractions, eg, $^4/_3$, $^6/_1$, and so on.

There are several solutions, but you need only discover one to enter the competition. There are two first prizes: for BBC micro users, an £80 package of Clares' *RAMROD* toolkit ROM chip and *MACROM* macro assembler, while for Master or Compact owners the top prize is worth £60 and consists of a Nidd Valley mouse with Clares' *Artroom* software. So please specify your computer when sending your entry. 100 runners up will each receive an *Artroom* demonstration disc (please specify whether 5.25in or 3.5in disc). Unfortunately, it only runs on the Master or Compact, but anyone else can reformat it and use it as a blank disc.




**Digimouse: packaged with Artroom**

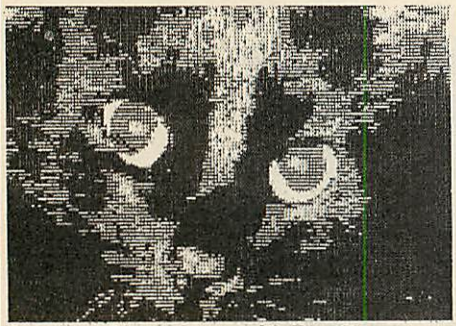
Answers on the back of an envelope or postcard, please, to arrive not later than February 11, 1987.

Send your entry to January Competition, *Acorn User*, 141/3 Drury Lane, London WC2B 5TF. Each entry must be accompanied by the coupon at the bottom of the page.

ACORN USER
COMPETITION
JANUARY

## ACORN USER OFFERS

# User Dump – Acorn User's printer control ROM – £19.95



Dump graphics screens with User Dump

*User Dump* includes a ROM chip which plugs into any free sideways ROM socket on your BBC micro, and an easy-to-follow manual. With the *User Dump* ROM installed you'll have access to a wide range of commands to help you control your printer's facilities – all for just £19.95.

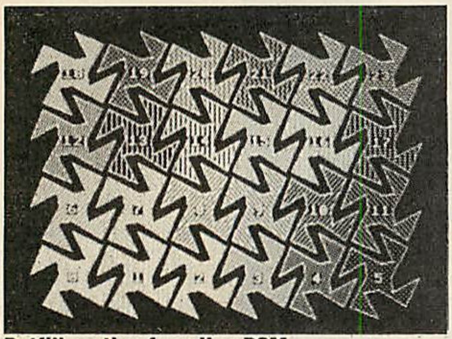
You will be able to dump any screen image in any display mode by entering a single command – either as a line of your program or alternatively by typing in direct from the keyboard. *User Dump* will also give a perfect dump while a machine code program is running.

This versatile ROM will work with all the popular dot-matrix printers, including all those with single and double density big-image graphics.

Send an A4 SAE to Seran at Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF, for more details.

Order form on page 130.

# User ROM – Acorn User on a chip only £19.95



Dotfill routine from UserROM

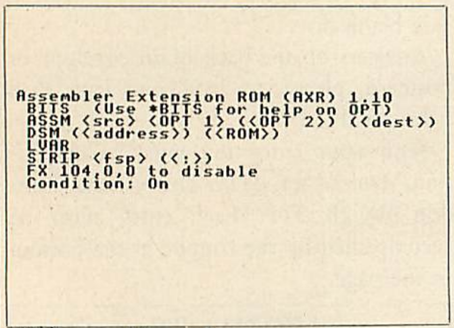
The *Acorn User UserROM* brings the best of *Acorn User* into your micro. Put together by our technical editor, Bruce Smith, this 8k ROM chip is packed with your favourite *Acorn User* routines. Simply plug the ROM chip into a sideways ROM socket and all the routines are instantly accessible via easy-to-use *commands – what could be simpler?

Routines include the popular colour fill and dot fill routines, bad program recovery, variable lister, function key lister, a graphics compiler, a circle drawing routine, sound compiler, plus lots, lots more!

Included with *UserROM* is a 22-page manual which explains how to get the most from your *UserROM*, and you'll find many demonstration programs showing how to use the new commands.

Full details available by sending an A4 SAE to Seran, Redwood Publishing, 141-143 Drury Lane, London WC2B 5TF.

# Acorn User Assembler Extension ROM just £19.95!




AXR for machine code programmers

The *Acorn User Assembler Extension ROM (AXR)* is aimed at the machine code programmer. It is compatible with Basic versions 1 and 2 – a Master version is due.

The *AXR* extends the Basic assembler to allow a variety of assembly options and commands. Some are outlined below.

- Bit 0 to 2 – Usual OPT functions
- Bit 3 set – Write to file and RAM
- Bit 4 set – Write to file only
- Bit 5 set – Branch to jump
- Bit 6 set – Enhanced error reporting
- Bit 7 set – Flag duplicate labels

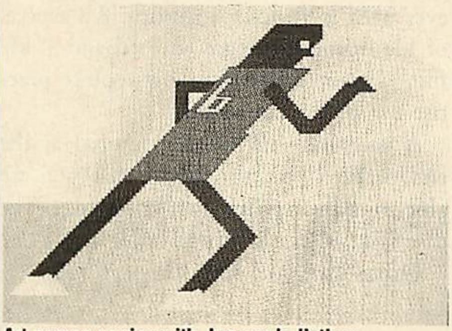
The *AXR* adds several new pseudo op codes to the assembler. These are: ORG – sets the origin for assembly; DST – specify destination; DFB – defines a byte; DFW – define word; DFD – define double word; DFR – define string; SWR – set the sideways RAM number.

Please send an SAE to Seran at Redwood Publishing for full details.

Order form on page 130 – 24 hour telephone service (0672) 40825

## ACORN USER OFFERS

# January listings on cassette £3.95 and disc £5.95


Art comes easier with January's listings

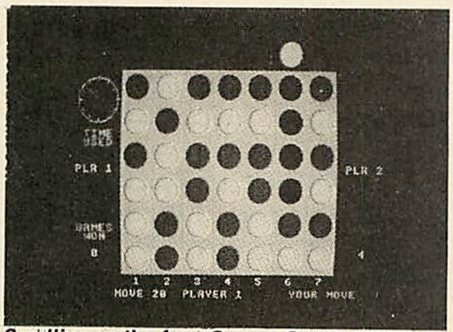
This month we feature John C. King's art package which is designed as an easy-to-use introduction to computer graphics for young children. Martin Phillips shows us how the FOR NEXT loops work and Tessie Revivis follows up with more simple assembler.

Joe Telford explains how to use the Scorpion and Mark de Weger presents more screens to use in the game of *Castle of Nightmares*!

All the programs in this issue are on both disc and cassette. The disc is fully menu driven and a good buy at only £5.95. Electron owners remember the disc is compatible with Advanced Plus 4 disc interface with 5.25in disc drives. There's a special graphics bonus on the cassette and disc. The cassette versions for both the BBC and Electron contains a tape to disc transfer program — all for just £3.95.

Order form on page 129.

# Free offers with disc and cassette subscriptions!



*Quadline* on the free *Games Compendium*

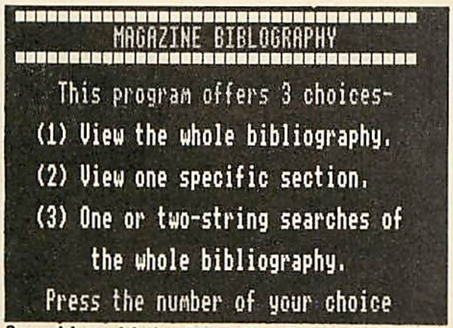
You can receive our superb quality disc binder worth £9.95 when you subscribe to our monthly listings disc. Made up in grey cloth, it includes six transparent inserts each capable of holding two 5.25in discs and a protective slip case. Send £69 while this offer lasts. Or, if you prefer, take out a subscription for six months at the discounted price of £30. (This offer is only open to UK readers.)

Plus receive our *Acorn User Games Compendium* cassette, free, when you subscribe to our monthly cassette listings, regularly delivered each month for £45.

The *Games Compendium* features some great entertainment for BBC micro, Master and Electron owners. It includes old favourites such as *Spectramania, Quadline, Picture Slide* and *3-D Maze*. You can also go collecting apples in *Shuggy's Garden*, or be all at sea in *Run Silent, Run Deep*.

Order form on page 129.

# Acorn User bibliography on disc from £7.95



Searching with the *Acorn User* Bibliography

If you've ever spent hours looking through your copies of *Acorn User* for an elusive article, which you know you've seen but can't remember when or where, then what you need is the *Acorn User* bibliography!

Our bibliography contains information on where to find games, listings, educational and utility programs; reviews of hardware, firmware, peripherals, software and books; and feature articles of specific and general interest. You'll even find reference to readers' letters! The *Acorn User* bibliography is sold in parts, in a specially enhanced format, to make your searches even faster, taking about 15 seconds on the 40-track and 40 seconds on the 80-track disc. Location of a reference is by one- or two-string searching and the user may specify the starting month and year.

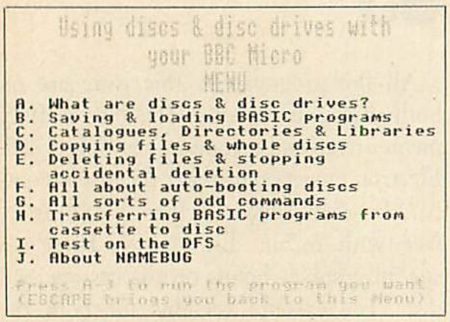
The bibliography is available from July 1982 to February 1986, an update is due soon. See the order form on page 130.

**Order form on page 129 & 130 – 24 hour telephone service (0672) 40825**

# NEW OFFERS

## ACORN USER OFFERS

# Get out of trouble with the Disc Help Disc – only £6.95




**The *Disc Help Disc's* menu page**

Have you just bought a disc interface or disc drive? Do you have a disc interface and drive but are bamboozled by all the jargon? Do you simply want to know all about discs and how to use your disc filing system ROM to its full potential?

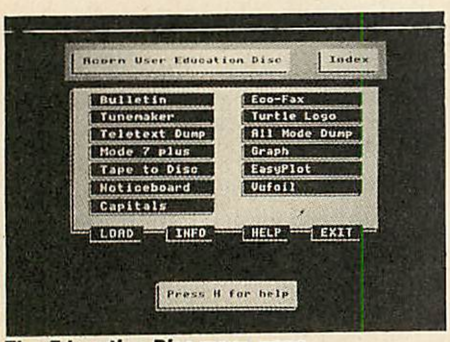
If you answer yes to any of these questions then *Acorn User* has the answer in the form of the *Disc Help Disc*, specially developed for the magazine by the North and Mid-Essex BBC Users Group.

Simply insert the *Disc Help Disc* into your drive and all the information you will ever need is at your fingertips. All aspects of file maintenance are covered and a disc filing system simulator allows you to practise use of the commands.

A question and answer tutorial at the end of each section ensures that you are able to evaluate your own knowledge. The disc is in 80-track format only.

Order using the form on page 130.

# Wise up with the Education Disc at just £7.95




**The *Education Disc* menu page**

The *Education Disc* contains programs drawn from *Acorn User* magazine.

*Eco-Fax* is a sophisticated viewdata-type database for use on Econet systems, and comes with its own versatile frame editor. There is a colourful version of *Turtle Logo*; a program which shows equations as graphs; and a music writing program which allows you to edit tunes.

Graphics are a strong feature of the collection, including the *Easyplot* drawing software, supported by two other programs which use *Easyplot* screens as an electronic noticeboard or in place of an overhead projector. A bulletin board displays messages in scrolling characters.

There are routines to use in your own Basic programs – screen dumps, a machine code utility and graphics plotting and drawing commands in mode 7. The disc is available in 40 track format only, but can be copied to an 80 track disc.

# Network Utility Disc only £19.95




**Bring teletext information to networks**

The *Acorn User Network Utility Disc* is the logical addition to your network, combining a wide range of invaluable routines with a sophisticated, yet easy-to-use teletext information system. The disc features:

- NetFax – our hybrid information system, provides thousands of pages of information which may be read without affecting any text or program in memory. It features an advanced teletext editor.
- Utilities for all network users, including a file locator and directory size finder.
- Utilities for network managers, including a bridge-compatible screen viewer and an efficient 'notify-all' facility.
- An auto-installer to transfer all of our utilities to your net painlessly.
- 150 NetFax pages, including instructions, help pages and sample indexes.

The *Acorn User Utility* disc is in 80-track format and costs just £19.95.

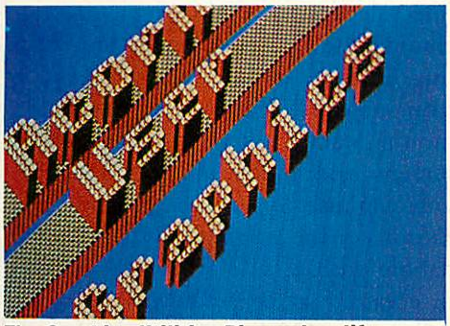
See page 130 for your order form.

**Order form on page 130 – 24 hour telephone service (0672) 40825**

# NEW OFFERS

## ACORN USER OFFERS

# Graphics Utilities Disc a bargain at £7.95



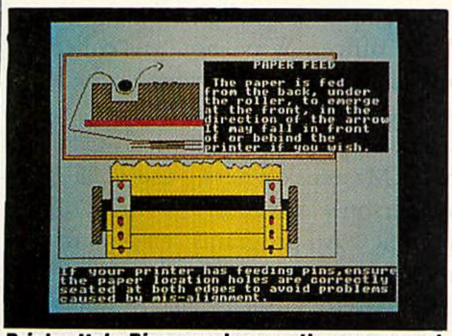
The *Graphics Utilities Disc* makes life easy

The *Acorn User Graphics Utilities Disc* contains four sections. Sixteen machine code routines enable you to manipulate blocks of graphics. Rotation and reflection utilities are included, together with a screen compressor/expander, a colour flood-fill routine and three screen-mode conversion commands.

The Basic procedure library includes routines to produce multi-height, proportional and justified text as well as a procedure for "drop-shadow" boxes. All of the procedures can be readily used in your own programs.

An advanced teletext screen editor gives you point-plotting and line-drawing, rubber-banding and even a flood-fill. In addition, full text facilities including all the mode 7 control codes are available. The program is easy to use with detailed help screens and has been written in 100 per cent machine-code for speed.

# Acorn User's comprehensive Printer Help Disc at £7.95




*Printer Help Disc:* much more than a manual

Written by Benjamin Rietti, the programs and tutorials on this disc will help you to understand your printer's facilities.

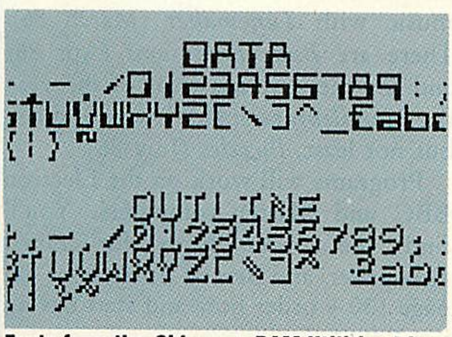
Printer manuals often don't fully cover the needs of Master and BBC micro series owners – our printer help disc will! It includes what to look for in a printer, controlling type styles, using *Wordwise* and *View*, screen images, printer care, an ASCII standard codes table plus how to print £ signs, clear diagrams illustrating various stages of printer use and a program to display type styles. The *Printer Help Disc* will help you solve problems.

The disc is available in 40 and 80 track format, and is compatible with the BBC models B, B+ and Master 128.

For more printer compatibility details please send a stamped addressed envelope to Seran, Redwood Publishing 141-143 Drury Lane, London WC2B 5TF.

Order form on page 130.

# Acorn User's Sideways RAM Utilities Disc £9.95




Fonts from the *Sideways RAM Utilities Disc*

What could be more helpful than our new *Sideways RAM Utilities Disc*?

Available in 40 track format with a transfer program for 80 track users, the disc includes:

- RamPad – an electronic notepad you can use at any time. Simply press a key for your computer's answer to the notebook and pencil.
- On-screen fonts – a variety of print styles available in all graphics modes.
- *HLP ROM – add your own help text to call up when you're really stuck.
- Standard ROM header – a sideways ROM header you can use as a starting point when writing your own ROMs.

Many more utilities – including *RLOOK to examine the contents of your ROM's and sideways RAM images. The disc is great value at just £9.95.

Order your *Sideways RAM Utility Disc* using the form on page 130.

Order form on page 130 – 24 hour telephone service (0672) 40825

# NEW OFFERS

## ACORN USER OFFERS

# New this month! The Gallery Collection – great graphics for only £6.95!

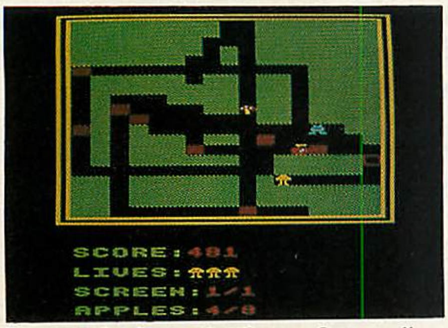

Dallas captured on the *Gallery Collection*

Christmas is not far around the corner, and with you in mind we've put together another stunning range of graphics screens, called the *Gallery Collection*. Combine the *Gallery* disc and *Gallery Collection* disc and you'll have an ideal gift for the graphics enthusiast or treat yourself!

The *Gallery Collection* features an automatic scrolling display of over 25 exciting graphics screens. Enjoy our fine selection of digitised pictures including the Dallas compendium, Spitting Images, and a picture of earth from space. Plus super cartoons, motor cars, some science fiction screens and much much more. Plus you can use *Super Painter* and *Pixel Editor* on the original *Gallery* disc to dabble with a little creativity and edit or create your own screens.

See page 130 for your order form.

# Acorn User's Games Compendium Cassette – £3.95



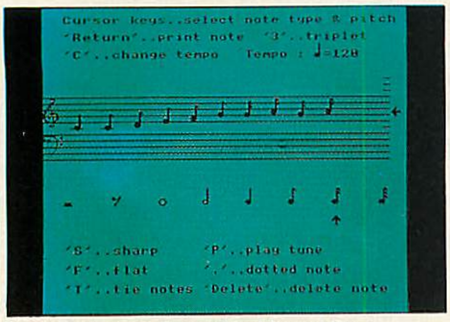
*Shuggy's Garden* on the *Games Compendium*

*The Acorn User Games Compendium* brings the best games published in *AU* over the past two years to BBC micro, Master and Electron owners. Included are David Acton's blockbuster *Spectramania* and the popular *Quadline* – see if you can get four in a row! Puzzle fanatics will get great enjoyment from our *Picture Slide* game while many will be amazed at Dave Lawrence's 3-D *Maze*. Adventurers can sample the delights of the *Acorn User* office. Why not go collecting apples in *Shuggy's Garden*, or be all at sea in *Run Silent, Run Deep*?

As a special bonus for BBC micro and Master owners, there is Rob Anderson's adventure with scrolling graphics. All programs can be transferred to disc automatically if desired. The cassette costs £3.95.

See page 130 for your order form.

# Acorn User Finest Favourites Cassette – just £3.95



Tunemaker: an *Acorn User* favourite

Following the popularity of the *Best of Acorn User* Cassette, we introduce our new favourites selection.

Don't miss captivating curves with *Lisajous Figures* (Nov 85). Use our *Screen Fonts* (Dec 85) to anotate charts and diagrams. And why not save those graphics screens in less space with the *Screen Compression* program (Dec 85).

Cheat at the popular game *Elite* with our *Elite Editor* (Feb 86). Try entering music with *Tunemaker* (March 86). There are *Basic Extensions* (Apr 86) and for the graphics treat of the year the *Mandlebrot Set* (May 86). And last but not least, *Puzzles* (July 86).

Programs will work on the Electron BBC and Master computers. You'll find the order form for *Finest Favourites* and *Best of Acorn User* on page 130 – order now and start having some fun!

**Order form on page 130 – 24 hour telephone service (0672) 40825**

# ACORN USER MAGAZINE SUBSCRIPTIONS A CHRISTMAS GIFT THAT IS APPRECIATED EVERY MONTH OF THE YEAR

At only £17.50, a year's subscription to Acorn User, the most stimulating, informative and entertaining magazine for the complete Acorn range of micros, makes the perfect present for family or friends.

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Account No: |_|_|_|_|_|_|_|_|_|_|_|_|_|_| Expiry Date |_|_|_|_|

SIGNED ________ DATE ________

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# ACORN USER'S GRAPHICS GALLERY

The Gallery Collection disc and our original Gallery disc will make an ideal Christmas gift for all graphics fans. The new Gallery Collection contains digitised screens which automatically scroll through scenes from Dallas, spitting images, a picture of earth from space, as well as many cartoons and sci-fi screens. Both discs are a real Christmas bargain at only £6.95 each.

# ACORN USER SPECIAL CASSETTES FOR CHRISTMAS

For great stocking fillers at only £3.95 each, Acorn User special cassettes are perfect Christmas gifts. There are four special cassettes in the range, including the popular Best of Acorn User and Acorn User Graphics cassettes, which are joined this month by Acorn User's Finest Fayourites and the Acorn User Games Compendium.

You will find many more Christmas gift ideas on the Acorn User offer pages (108-112).

# YELLOW PAGES

## INDEX/COMPATIBILITY

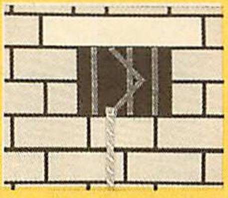
### Entering listings

To make the task of entering listings easier, *Acorn User* has adopted several standards in the Yellow Pages. Programs are listed with line numbers in increments of 10, so type AUTO <Return> for automatic line numbering before you start. Before you list what you've entered, type LISTO 1 <Return> to provide spaces after the line numbers. Programs in the Yellow Pages are often listed to a width of 40 characters, so type MODE 6 <Return> before you start. Comparing the line-endings of your listing with the Yellow Pages will help you spot extra or missing characters.

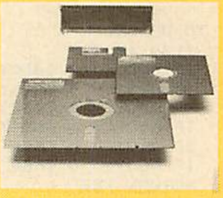
To make sure that the program you want to enter will work on your particular machine, check the index below. All the listings work with Basic 1,2 and 4 (unless stated otherwise) and with operating system OS1.2 or above. If a program is accompanied by an article, please read the article first. If special care is needed when entering, we provide a 'How to Enter' box.

Once you've typed in your program, save it to tape or disc then test it by running it. If you've made a mistake, an error message will appear, telling you which line contains the error. List the line and check it. If the line is the start of a procedure definition the error may be a line which calls the procedure.

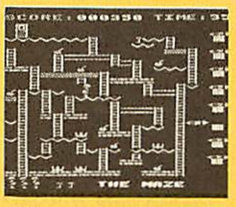




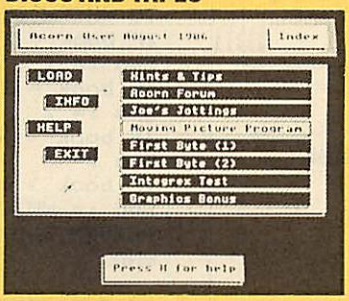









### DISCS AND TAPES




All the listings on these pages can be found on this month's listings disc or cassette. See page 109 for details.

### BACK ISSUES







For help with entering and debugging listings see the following back issues: April '86, June '85, Aug '84, Sept '83.

| Program | Page | BBCB | BBCB+/128k | BBC with ADFS | Shadow RAM | Electron | Electron with Plus 1 | Plus 1 and Plus 3 | Master 128 | Master 128+ ADFS | Master Compact | 6502 | Econet | Tape and disc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Joe's Jottings | 114 | | | | | | | | | | | | | |
| All listings | | Y[2] | Y[2] | Y[2] | Y[2] | N | N | N | Y[2] | Y[2] | N | N | N | Y[2] |
| Kiddie Art | 116 | | | | | | | | | | | | | |
| Listing 1 and 2 | | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Disc Cataloguing | 118 | | | | | | | | | | | | | |
| Listing 1 and 2 | | Y | Y | N | Y | N | N | N | Y | N | N | Y | Y | Y |
| Compact transfer | 121 | | | | | | | | | | | | | |
| Listing 1 and 2 | | Y | Y | Y | Y | N | N | N | Y | Y | Y[3] | N | N | Y |
| Castle of Nightmares | 123 | | | | | | | | | | | | | |
| Listing 1 | | Y | Y | N | N | Y | Y | N | Y | Y | Y | N | N | Y |
| Listing 2 | | Y | Y | N | N | Y | Y | N | Y | Y | Y | N | N | Y |
| Acorn Forum | 126 | | | | | | | | | | | | | |
| Listing 1 | | Y | Y | Y | Y | N | N | N | Y | Y | Y | N | Y | Y |
| Listing 3[4] | | Y | Y | Y | Y | N | N | N | Y | Y | Y | N | Y | Y |

*Y = Yes* *N = No*
*[1] = Requires Acornsoft GXR ROM*
*[2] = Requires Scorpion*
*[3] = Requires serial upgrade*
*[4] = Basic 1 only*

# JOE'S JOTTINGS

See Scorpion Rising, page 81

**Listing 1. To decode key presses on an electronic book**

```
TO RB
 FOREVER book := READBOOK
END

TO READBOOK
 IF SENSE 1 > 1500 AND SENSE 1 < 1600 [ADC1 := 6]
                      ELSE [ADC1 := (SENSE 1 - 410) / 260]
 IF SENSE 2 > 1500 AND SENSE 2 < 1600 [ADC2 := 6]
                      ELSE [ADC2 := (SENSE 2 - 410) / 260]
 ADC1 := 6 - ADC1
 ADC2 := 6 - ADC2
 RETURN DECODE
END

TO DECODE
 flag := 0
 IF ADC1 = 4 [ADC1 := 6 flag := 1]
 IF ADC1 = 6 AND flag = 0 [ADC1 := 4 flag := 0]
 IF ADC2 = 4 [ADC2 := 6 flag := 1]
 IF ADC2 = 6 AND flag = 0 [ADC2 := 4 KEE := 0]
 IF ADC1 > 0 [KEE := ADC1]
 IF ADC2 > 0 [KEE := ADC2 + 6]
 RETURN KEE
END
```

*Please note it is important to enter the listings as shown above – don't press Return except at the end of the line. This is why the listings have been reduced to a different size.*

**Listing 2. Driving instrument control panel on electronic book**

```
TO MEASURE
IF SENSE 1 > 1500 AND SENSE 1 < 1600
ADC1 := 6
ELSE ADC1 := (SENSE 1 - 410) / 260
IF SENSE 2 > 1500 AND SENSE 2 < 1600
AD := 6
ELSE ADC2 := (SENSE 2 - 410) / 260
ADC1 := 6 - ADC1
ADC2 := 6 - ADC2
RETURN DECODE
END
ADC1:=0
ADC2:=0

TO DECODE
flag := 0
IF ADC1 = 4
[ADC1 := 6
 flag := 1]
IF ADC1 = 6 AND flag = 0
ADC1 := 4
flag := 0
IF ADC2 = 4
[ADC2 := 6
 flag := 1]
IF ADC2 = 6 AND flag = 0
ADC2 := 4
KEE := 0
IF ADC1 > 0
KEE := ADC1
IF ADC2 > 0
```

Continued ▶

◀ Joe's listing 2 continued

```
KEE := ADC2 + 6
RETURN KEE
END
flag:=0
KEE:=0

TO READBOOK
IF SENSE 1 > 1500 AND SENSE 1 < 1600
ADC1 := 6
ELSE ADC1 := (SENSE 1 - 410) / 260
IF SENSE 2 > 1500 AND SENSE 2 < 1600
ADC2 := 6
ELSE ADC2 := (SENSE 2 - 410/ 260


ADC1 := 6 - ADC1
ADC2 := 6 - ADC2
RETURN DECODE
END

TO RB
FOREVER book := READBOOK
END
book:=0

TO SERVO_PANEL
CENTRE_SERVOS
FOREVER SERVO_CONTROL
END

TO WHICH_SERVO
IF book = 1 OR book = 4
Sno := 1
IF book = 2 OR book = 5
Sno := 2
IF book = 3 OR book = 6
Sno := 3
IF book > 6 OR book = 0
Sno := WHICH_SERVO
RETURN Sno
END

TO TURN_SERVO (Sno)
IF book = 7 OR book = 10
DEC_SERVO (Sno)
IF book = 9 OR book = 12
INC_SERVO (Sno)
END
Sno:=3

TO DEC_SERVO (Sno)
servos (Sno) := servos (Sno) - 2
IF servos (Sno) < 0
servos (Sno) := 0
ANGLE Sno := servos (Sno)
END

TO INC_SERVO (Sno)
servos (Sno) := servos (Sno) + 2
IF servos (Sno) > 254
servos (Sno) := 254
ANGLE Sno := servos (Sno)
END

TO SERVO_CONTROL
Sno := WHICH_SERVO
PRINT "SERVO: " , Sno , " Selected"
WHILE book > 0
[]
 WHILE book = 0 OR boo > 6
```

Continued ▶

# JOE'S JOTTINGS

**◄ Joe's listing 2 continued**

```
  [TURN_SERVO (Sno)]
  END

 TO CENTRE_SERVOS
 DIM servos (3)
 servos (1) := 128
 servos (2) := 128
 servos (3) := 128
 MOTOR (1 2 3)
 SETANGLE (128 128 128)
 END
```

**Listing 3. Reads temperature**

```
TO GRAPH_TEMP
 t1 := SENSE 3
 FOREVER  [
  WAIT 1000
  t1 := (t1 + SENSE 3) / 2 PRINT (t1 - 640) * 8
 ]
END
```

**Listing 4a. Scorpion as a co-processor**

```
 10 REM Scorpion as a CO-Processor
 20 REM Program for BBC Micro side
 30 REM Joe Telford 1986
 40 MODE 0
 50 VDU28,0,3,79,0
 60 *FX2,1
 70 INPUT temp:x=0:MOVE x,temp
 80 REPEAT INPUT temp
 90  x=x+2:DRAW x,temp
100 UNTIL x>1000
110 *FX2,0
120 END
```

**Listing 4b. Logs temperature**

```
TO LOG_TEMP
 PRINT "ch=OPENOUT(f$)"
 TIME := 0
 WHILE TIME < 3600000  [
  WAIT 30000
  PRINT "PRINT#ch," , SENSE 3
 ]
 PRINT "CLOSE#ch"
END
```

**Listing 5. To plot a Scorpion generated file**

```
 10 REM BBC & Scorpion Shared filing
 20 REM by Joe Telford
```

Continued ►

**◄ Joe's listing 5 continued**

```
 30 REM for B/B+/M with Scorpion
 40 :
 50 MODE 0
 60 ch=OPENUP"TEMPFILE"
 70 REPEAT INPUT#ch, A
 80 x=x+10:DRAW x,(A-630)*10
 90 UNTIL EOF#ch: CLOSE #ch
100 END
```

**Listing 6. Benchmark tests**

```
TO BM1
 REPEAT 1000 []
 PRINT TIME
END

TO BM1a
 REPEAT 1000 []
 PRINT TIME
END

TO BM1b
 REPEAT 1000 []
 PRINT TIME
END

TO STARTBM1
 TIME := 0
 START BM1
 START BM1a
 START BM1b
END

TIME := 0  BM1
STARTBM1

TO BM2
 L := 2
 REPEAT 1000 [K := L * 2 / 2 + 2 - 2]
 PRINT TIME
END

TO BM2a
 L := 2
 REPEAT 1000 [K := L * 2 / 2 + 2 - 2]
 PRINT TIME
END

TO BM2b
 L := 2
 REPEAT 1000 [K := L * 2 / 2 + 2 - 2]
 PRINT TIME
END

TO STARTBM2
 TIME := 0
 START BM2
 START BM2a
 START BM2b
END

TIME := 0 BM2
STARTBM2

TO BM3
 REPEAT 1000 [MOTOR 1 SA SENSE 1 / 8]
 PRINT TIME
END
```

Continued ►

◀ **Joe's listing 6 continued**

```
TO BM3a
 REPEAT 1000 [MOTOR 2 SA SENSE 2 / 8]
 PRINT TIME
END

TO BM3b
 REPEAT 1000 [MOTOR 3 SA SENSE 3 / 8]
 PRINT TIME
END

TO STARTBM3
 TIME := 0
 START BM3
 START BM3a
 START BM3b
END

TIME := 0 BM3
STARTBM3

TO BM4
 REPEAT 1000 [K := NET 64 , 255]
 PRINT TIME
END

TO BM4a
 REPEAT 1000 [K := NET 64 , 255]
 PRINT TIME
END

TO BM4b
 REPEAT 1000 [K := NET 64 , 255]
 PRINT TIME
END

TO STARTBM4
 TIME := 0

 START BM4
 START BM4a
 START BM4b
END

TIME := 0 BM4
STARTBM4
```

| Benchmark | Time for single task | Time for three parallel tasks | Overhead per task |
|---|---|---|---|
| BM1. 1000 repeats | 0.62s | 1.98s | 0.04s |
| BM2. 1000 arithmetic | 9.95s | 30.45s | 0.20s |
| BM3. 1000 IO ops | 14.75s | 45.33s | 0.36s |
| BM4. 1000 LAN ops | 6.60s | 20.52s | 0.24s |

See the bench test programs (listing 6) for details

**Table 1. Benchmarks for Scorpion running version 60731 software**

**See Big, Bright and Beautiful, page 87**

**Listing 1. Kiddie Art loader program**

```
10 REM Images loader - listing 1
20 REM by John King
30 REM for BBC B/B+/M/C/E
40 REM (c) Acorn User January 1987
50 :
60 M%=&2C18
70 ?M%=&FF
80 CHAIN"IM1"
```

**Listing 2. Main Kiddie Art program**

```
 10 REM IM1 Images - main program
 20 REM by John King
 30 REM for BBC B/B+/M/C/E
 40 REM (c) Acorn User January 1987
 50 :
 60 MODE2
 70 ON ERROR PROCerr
 80 HIMEM=&2C18
 90 DIM osc% 50
100 *KEY10|MOLD|MRUN|M
110 VDU 23,1,0;0;0;0;
120 M%=&2C18
130 *FX4,1
140 IF ?M%<>&FF PROCpic ELSE PROCstart
150 C%=0:PROCc
160 F%=1
170 *FX12,1
180 *FX225,2
190 *FX226,2
200 R%=0:T%=TIME
210 GCOL4,8
220 REPEAT
230 *FX21,0
240 K%=GET:Z%=TIME
250 IF K%=R% AND K%<=3 AND Z%-T%<150 T
HEN 300
260 IF K%=2 PROCs
270 IF K%=3 PROCt
280 IF K%=83 PROCsv
290 IF K%=76 PROCld
300 IF F%<>1 PROCoptions
310 T%=Z%:R%=K%
320 UNTIL FALSE
330 :
340 DEF PROCs
350 IF F%=0 PROCstore
360 A%=1
370 IF POINT(640,512)=C% PROCc
380 X%=640:Y%=512
390 PLOT69,X%,Y%
400 FOR P%=2 TO 18 STEP 2
410 X%=X%-8:Y%=Y%-8
420 PROCse
430 NEXT
440 P%=19:X%=568:Y%=440:F%=0
450 ENDPROC
460 :
470 DEF PROCt
480 IF F%=0 PROCstore
490 A%=0
500 IF POINT(648,480)=C% PROCc
510 X%=648:Y%=480
520 FOR P%=2 TO 18 STEP4
530 X%=X%-16:Y%=Y%-8
540 PROCte
550 NEXT
560 X%=568:Y%=440:P%=18:F%=0
570 ENDPROC
580 :
590 DEF PROCsv
600 IF F%=0 PROCstore
610 COLOUR134:CLS:COLOUR1
620 PRINTTAB(4,1)"SAVE PICTURE"
630 PROCgetfile
640 *OPT1,1
650 n$="SAVE "+n$+" "+STR$~M%+"+"+STR$
~(?M%*5+1)
660 PROCoscli(n$)
670 PROCf
680 ENDPROC
690 :
700 DEF PROCld
710 COLOUR134:CLS:COLOUR1
```

**Continued ▶**

◀ Kiddie Art program continued

```
720 PRINTTAB(4,1)"LOAD PICTURE"
730 PROCgetfile
740 *OPT1,1
750 VDU28,0,21,19,18
760 n$="LOAD "+n$+" "+STR$~M%
770 PROCoscli(n$)
780 VDU26
790 PROCf
800 ENDPROC
810 :
820 DEF PROCoptions
830 IF K%=8 PROCc
840 IF A%=1 PROCsqr ELSE PROCtri
850 ENDPROC
860 :
870 DEF PROCsqr
880 IF K%=4 OR K%=136 PROCsl
890 IF K%=5 OR K%=137 PROCsr
900 IF K%=6 OR K%=139 PROCsu
910 IF K%=7 OR K%=138 PROCsd
920 IF K%=9 PROCes
930 IF K%=10 PROCss
940 ENDPROC
950 :
960 DEF PROCtri
970 IFK%=4 OR K%=136 PROCtl
980 IFK%=5 OR K%=137 PROCtr
990 IFK%=6 OR K%=139 PROCtu
1000 IFK%=7 OR K%=138 PROCtd
1010 IFK%=9 PROCet
1020 IFK%=10 PROCst
1030 ENDPROC
1040 :
1050 DEF PROCsl
1060 IF X%<-1308 ENDPROC
1070 X%=X%-8
1080 PROCv
1090 ENDPROC
1100 :
1110 DEF PROCsr
1120 IF X%>1280 ENDPROC
1130 PROCv
1140 X%=X%+8
1150 ENDPROC
1160 :
1170 DEF PROCsu
1180 IF Y%>1024 ENDPROC
1190 Y%=Y%+4:PROCh
1200 Y%=Y%+4:PROCh
1210 ENDPROC
1220 :
1230 DEF PROCsd
1240 IF Y%<-1308 ENDPROC
1250 PROCh:Y%=Y%-4
1260 PROCh:Y%=Y%-4
1270 ENDPROC
1280 :
1290 DEF PROCv
1300 MOVE X%,Y%
1310 DRAW X%,Y%+8*P%-8
1320 MOVE X%+8*P%,Y%
1330 DRAW X%+8*P%,Y%+8*P%-8
1340 ENDPROC
1350 :
1360 DEF PROCh
1370 MOVE X%,Y%-4
1380 DRAW X%+8*P%-8,Y%-4
1390 MOVE X%,Y%+8*P%-8
1400 DRAW X%+8*P%-8,Y%+8*P%-8
```

Continued ▶

◀ Kiddie Art program continued

```
1410 ENDPROC
1420 :
1430 DEF PROCes
1440 IF P%>=161 ENDPROC
1450 X%=X%-8:Y%=Y%-8:P%=P%+1
1460 PROCse
1470 P%=P%+1
1480 ENDPROC
1490 :
1500 DEF PROCss
1510 IF P%<4 ENDPROC
1520 P%=P%-1
1530 PROCse
1540 P%=P%-1:X%=X%+8:Y%=Y%+8
1550 ENDPROC
1560 :
1570 DEF PROCse
1580 MOVE X%,Y%
1590 PLOT 9,8*P%,0
1600 PLOT 9,0,8*P%
1610 PLOT 9,-8*P%,0
1620 PLOT 9,0,-8*P%
1630 MOVE X%+8,Y%+4
1640 PLOT 9,8*(P%-1),0
1650 MOVE X%+8,Y%+8*P%-4
1660 PLOT 9,8*(P%-1),0
1670 ENDPROC
1680 :
1690 DEF PROCsqfix
1700 GCOL 0,C%
1710 MOVE X%,Y%
1720 PLOT 0,0,8*P%-8
1730 PLOT 81,8*P%-8,-8*P%+8
1740 PLOT 81,0,8*P%-8
1750 GCOL 4,8
1760 ENDPROC
1770 :
1780 DEF PROCtl
1790 IF X%<-1308 ENDPROC
1800 X%=X%-8:PROCslo
1810 ENDPROC
1820 :
1830 DEF PROCtr
1840 IF X%>1280 ENDPROC
1850 PROCslo:X%=X%+8
1860 ENDPROC
1870 :
1880 DEF PROCtu
1890 IF Y%>1024 ENDPROC
1900 PROCb:Y%=Y%+8
1910 ENDPROC
1920 :
1930 DEF PROCtd
1940 IF Y%<-1308 ENDPROC
1950 Y%=Y%-8:PROCb
1960 ENDPROC
1970 :
1980 DEF PROCslo
1990 MOVE X%,Y%
2000 PLOT 1,4*P%,4*P%
2010 PLOT 0,4*P%+8,-4*P%
2020 PLOT 1,-4*P%,4*P%
2030 ENDPROC
2040 :
2050 DEF PROCb
2060 MOVE X%,Y%
2070 PLOT 1,8*P%,0
2080 MOVE X%,Y%+4
2090 PLOT 1,8*P%,0
2100 MOVE X%,Y%+8
2110 PLOT 1,4*P%,4*P%
2120 PLOT 0,4*P%,-4*P%
2130 PLOT 9,-4*P%,4*P%
2140 MOVE X%,Y%+8
```

Continued ▶

◀ Kiddie Art program continued

```
2150 PLOT 65,4*P%,4*(P%-1)
2160 ENDPROC
2170 :
2180 DEF PROCet
2190 IF P%>161 ENDPROC
2200 X%=X%-16:Y%=Y%-8:P%=P%+4
2210 PROCte
2220 ENDPROC
2230 :
2240 DEF PROCst
2250 IF P%<6 ENDPROC
2260 PROCte
2270 X%=X%+16:Y%=Y%+8:P%=P%-4
2280 ENDPROC
2290 :
2300 DEF PROCte
2310 MOVE X%,Y%
2320 PLOT 9,8*P%,0
2330 PLOT 9,-4*P%,4*P%
2340 PLOT 9,-4*P%,-4*P%
2350 MOVE X%+8,Y%+4
2360 PLOT 9,8*P%-8,0
2370 IF P%=2 ENDPROC
2380 MOVE X%,Y%
2390 PLOT 65,4*P%,4*(P%-1)
2400 ENDPROC
2410 :
2420 DEF PROCtrifix
2430 GCOL 0,C%
2440 MOVE X%,Y%
2450 PLOT 0,8*P%,0
2460 PLOT 81,-4*P%,4*P%
2470 GCOL 4,8
2480 ENDPROC
2490 :
2500 DEF PROCstore
2510 IF A%=1 PROCsqfix ELSE PROCtrifix
2520 B%=(X%AND&FFF)DIV16
2530 D%=(X%AND&FFF)MOD16*16+(Y%AND&FFF)
DIV256
2540 E%=(Y%AND&FFF)MOD256
2550 S%=((A%=1)+1)*128+C%
2560 IF B%=0 AND D%=15 AND E%=128 AND P
%=161 ?M%=0
2570 IF ?M%=186 SOUND1,-15,101,10
2580 IF ?M%=191 SOUND1,-15,101,20
2590 IF ?M%=196 SOUND0,-15,2,20
2600 IF ?M%=199 ENDPROC
2610 M%?(5*?M%+1)=B%
2620 M%?(5*?M%+2)=D%
2630 M%?(5*?M%+3)=E%
2640 M%?(5*?M%+4)=P%
2650 M%?(5*?M%+5)=S%
2660 ?M%=?M%+1
2670 ENDPROC
2680 :
2690 DEF PROCpic
2700 FOR I%=0 TO ?M%-1
2710 B%=M%?(5*I%+1)
2720 D%=M%?(5*I%+2)
2730 E%=M%?(5*I%+3)
2740 P%=M%?(5*I%+4)
2750 S%=M%?(5*I%+5)
2760 IF S%>=128 A%=0 ELSEA%=1
2770 C%=S% MOD 128
2780 X%=B%*16+D% DIV 16
2790 IF X%>2792 X%=X% OR &FFFFF000
2800 Y%=D% MOD 16*256+E%
2810 IF Y%>2792 Y%=Y% OR &FFFFF000
2820 IF A%=1 PROCsqfix ELSE PROCtrifix
2830 NEXT
2840 ENDPROC
2850 :
2860 DEF PROCc
```

Continued ▶

◀ Kiddie Art program continued

```
2870 C%=(C%+1) MOD 8
2880 FOR count%=8 TO 15
2890 VDU 19,count%,C%,0,0,0
2900 NEXT
2910 ENDPROC
2920 :
2930 DEF PROCgetfile
2940 COLOUR4
2950 VDU23,1,1;0;0;0;
2960 PRINTTAB(2,11)"WHAT IS THE NAME"
2970 PRINTTAB(2,13)"OF YOUR PICTURE?"
2980 INPUT'"   "n$
2990 ENDPROC
3000 :
3010 DEF PROCf
3020 COLOUR1
3030 PRINTTAB(4,30)"PRESS ANY KEY"
3040 *FX21,0
3050 K%=GET
3060 VDU23,1,0;0;0;0;
3070 COLOUR 128:CLS
3080 PROCpic
3090 ENDPROC
3100 :
3110 DEF PROCstart
3120 CLS:COLOUR 1
3130 PRINT TAB(7,12)"IMAGES"
3140 COLOUR 3
3150 PRINT TAB(4,14)"Press any key"
3160 PRINT TAB(5,16)" to start"
3170 K%=GET:CLS
3180 ?M%=0
3190 ENDPROC
3200 :
3210 DEF PROCerr
3220 COLOUR 134
3230 VDU 26
3240 CLS
3250 COLOUR 1
3260 PRINTTAB(0,10)
3270 REPORT
3280 IF ERR=17 PROCq
3290 PRINT TAB(20)"PRESS ANY KEY"
3300 *FX21,0
3310 K%=GET
3320 IF K%<>81 AND K%<>113 RUN
3330 END
3340 :
3350 DEF PROCq
3360 PRINT''"PRESS Q TO QUIT"
3370 PRINT'"OTHERWISE"
3380 ENDPROC
3390 :
3400 DEF PROCoscli($osc%)
3410 X%=osc% MOD 256
3420 Y%=osc% DIV 256
3430 CALL &FFF7
3440 ENDPROC
```

See Keep track, page 94

**Listing 1. Disc Indexer program**

```
10 REM Disc Indexer Program
20 REM by John Weller
30 REM for BBC B/B+/M/E with DFS
40 REM (c) Acorn User January 1987
50 :
60 MODE 7
80 PROCinit
```

Continued ▶

**◀ Disc Indexer program continued**

```
   90 PROCstart
  100 PROCreaddisc
  110 PROCsort
  120 PROCoutput
  130 END
  140 :
  150 DEF FNindnam
  160 PRINT''CHR$(130);"Index Name?";
  170 PRINTCHR$(131);
  180 INPUT""indexname$
  190 =indexname$
  200 :
  210 DEF FNfin
  220 PRINT'CHR$(133);"Are you sure?";CH
R$(134);"(Y/N)"
  230 g%=GET OR 32
  240 =(g%=121)
  250 :
  260 DEF PROCinit
  270 LOCAL dummyfile$,dummyside$
  280 LOCAL dummytitle$
  290 PROCdouble("Setting Up-Please Wait
")
  300 sector%=0:disc%=0:entry%=0
  310 maxdiscs%=40:maxentries%=600
  320 osword%=&FFF1:oscli%=&FFF7
  330 *FX 225,240
  340 !&81=&900:?&85=3
  350 ?&86=&53:?&87=0:?&89=&22
  360 DIM disctitle$(maxdiscs%)
  370 DIM file$(maxentries%)
  380 DIM name%(maxentries%)
  390 DIM side$(maxentries%)
  400 DIM line% 16
  410 dummyfile$=STRING$(9," ")
  420 dummyside$=" "
  430 dummytitle$=STRING$(12," ")
  440 FOR A%=0 TO maxentries%
  450 file$(A%)=dummyfile$
  460 side$(A%)=dummyside$
  470 NEXT A%
  480 FOR A%=0 TO maxdiscs%
  490 disctitle$(A%)=dummytitle$
  500 NEXT A%
  510 CLS
  520 ENDPROC
  530 :
  540 DEF PROCstart
  550 PROCdouble("Disc Indexer Program")
  560 VDU 28,0,24,39,5
  570 PRINTCHR$(130);"Put in each";
  580 PRINT" disc when requested then"
  590 PRINTCHR$(130);"press";
  600 PRINTCHR$(129);"f0";CHR$(130);
  610 PRINT"to index the disc."
  620 PRINTCHR$(130);"When all discs";
  630 PRINT" are indexed press";
  640 PRINTCHR$(129);"f7"
  650 PRINTCHR$(130);"to terminate."
  660 PRINT''CHR$(130);"Drive 0/2";
  670 PRINTCHR$(134);"(0)";CHR$(130);
  680 PRINT"or 1/3";CHR$(134);"(1)"
  690 REPEAT
  700 drive%=GET-48
  710 UNTIL drive%=0 OR drive%=1
  720 PRINT''CHR$(130);"Do you have";
  730 PRINT" a Data file to load?"
  740 g%=GET OR 32
  750 IF g%=121 THEN PROCreaddata ELSE i
ndexname$=FNindnam
  760 ENDPROC
  770 :
```

Continued ▶

**◀ Disc Indexer program continued**

```
  780 DEF PROCreaddata
  790 PRINT''CHR$(130);"File Name?";
  800 PRINTCHR$(131);
  810 INPUT""indexname$
  820 IF LEFT$(indexname$,2)<>"D." AND L
EFT$(indexname$,2)<>"d." THEN indfilname
$="D."+indexname$ ELSE indfilname$=index
name$:indexname$=RIGHT$(indexname$,LEN(i
ndexname$)-2)
  830 PROCdrive:PROCspace
  840 *DR.0
  850 ch%=OPENIN(indfilname$)
  860 INPUT#ch%,disc%,entry%
  870 FOR A%=1 TO disc%
  880 INPUT#ch%,disctitle$(A%)
  890 NEXT A%
  900 FOR A%=1 TO entry%
  910 INPUT#ch%,file$(A%)
  920 INPUT#ch%,name%(A%),side$(A%)
  930 NEXT A%
  940 CLOSE#ch%
  950 PRINT''CHR$(130);"File Loaded"''
  960 ENDPROC
  970 :
  980 DEF PROCreaddisc
  990 REPEAT
 1000 PRINT'CHR$(129);"Put in disc"
 1010 REPEAT
 1020 g%=GET
 1030 UNTIL g%=240 OR g%=247
 1040 IF g%=247 THEN GOTO 1200
 1050 FOR currdrive%=drive% TO drive%+2
STEP 2
 1060 disc%=disc%+1
 1070 sector%=0
 1080 swap%=FALSE
 1090 largecat%=FALSE
 1100 PROCloadcat
 1110 PROCtitle(disc%)
 1120 PRINTTAB(20);disctitle$(disc%)
 1130 PROCreadcat
 1140 sector%=2
 1150 PROCloadcat
 1160 IF ?&900=&AA AND ?&901=&AA THEN la
rgecat%=TRUE
 1170 IF swap%=TRUE THEN PROCswapcat
 1180 IF largecat%=TRUE OR swap%=TRUE TH
EN PROCreadcat
 1190 NEXT currdrive%
 1200 UNTIL disc%>=(maxdiscs%-2) OR entr
y%>=(maxentries%-31) OR g%=247
 1210 ENDPROC
 1220 :
 1230 DEF PROCloadcat
 1240 ?&80=currdrive%
 1250 ?&88=sector%
 1260 X%=&80:Y%=0:A%=&7F
 1270 CALL osword%
 1280 ENDPROC
 1290 :
 1300 DEF PROCtitle(X%)
 1310 !&100=!&0900
 1320 !&104=!&0904
 1330 !&108=!&0A00
 1340 ?&10C=&0D
 1350 temp$=""
 1360 FOR A%=&100 TO &10B
 1370 char%=?A%:IF char%<32 OR char%>126
 THEN char%=32
 1380 temp$=temp$+CHR$(char%)
 1390 NEXT A%
```

Continued ▶

◀ Disc Indexer program continued

```
1400 disctitle$(X%)=temp$
1410 ENDPROC
1420 :
1430 DEF PROCreadcat
1440 FOR A%=1 TO 31
1450 PROCfile(A%)
1460 IF dir%=0 THEN GOTO 1520
1470 IF filename$="!!!!!!!" THEN swap%=
TRUE:GOTO 1520
1480 entry%=entry%+1
1490 file$(entry%)=CHR$(dir%)+"."+filen
ame$
1500 name%(entry%)=disc%
1510 side$(entry%)=STR$(currdrive%)
1520 NEXT A%
1530 ENDPROC
1540 :
1550 DEF PROCfile(X%)
1560 dir%=?(&0907+X%*8)AND&7F
1570 IF dir%<&21 OR dir%>&7E THEN dir%=
0
1580 ?(&0907+X%*8)=&0D
1590 filename$=$(&0900+X%*8)
1600 ENDPROC
1610 :
1620 DEF PROCsort
1630 PRINT''CHR$(130);
1640 PRINT"Alphabetical sort";
1650 PRINTCHR$(134);"(Y/N)"
1660 REPEAT
1670 g%=GET OR 32
1680 UNTIL g%=110 OR g%=121
1690 IF g%=110 THEN CLS:GOTO 1910
1700 CLS
1710 PRINT''CHR$(130);"Sorting the";
1720 PRINTCHR$(133);entry%;
1730 PRINTCHR$(130);"programs"
1740 PRINT'CHR$(133);"Program "
1750 VDU 23;11,0;0;0;0
1760 FOR A%=1 TO entry%-1
1770 PRINTTAB(11,4);A%+1
1780 FOR C%=A%+1 TO entry%
1790 IF MID$(file$(A%),3,3)<MID$(file$(
C%),3,3) THEN GOTO 1890
1800 temp$=file$(A%)
1810 file$(A%)=file$(C%)
1820 file$(C%)=temp$
1830 temp%=name%(A%)
1840 name%(A%)=name%(C%)
1850 name%(C%)=temp%
1860 temp$=side$(A%)
1870 side$(A%)=side$(C%)
1880 side$(C%)=temp$
1890 NEXT C%
1900 NEXT A%
1910 PRINT''CHR$(130);"Output Ready"
1920 PROCspace
1930 ENDPROC
1940 :
1950 DEF PROCoutput
1960 ON ERROR PROCerror:GOTO 1960
1970 CLS
1980 PRINT''CHR$(130);"1. Output to Scr
een"
1990 PRINTCHR$(130);"2. Output to Print
er"
2000 PRINTCHR$(130);"3. Spool to Disc"
2010 PRINTCHR$(130);"4. Create Data Fil
e"
2020 PRINTCHR$(130);"5. Finished"
2030 PRINT''CHR$(134);"Enter Choice"
2040 REPEAT
```

Continued ▶

◀ Disc Indexer program continued

```
2050 g%=GET-48
2060 UNTIL g%>0 AND g%<6
2070 ON g% GOTO 2090,2170,2190,2210,223
0
2080 REM Output to screen
2090 VDU 14,12
2100 PRINTCHR$(130);"Press";
2110 PRINTCHR$(134);"SHIFT";
2120 PRINTCHR$(130);"to continue"
2130 PROCscreen
2140 PROCspace
2150 VDU 15:GOTO 1970
2160 REM Output to printer
2170 PROCprint:GOTO 1970
2180 REM Spool to disc
2190 PROCspool:GOTO 1970
2200 REM Create data file
2210 PROCwritedata:GOTO 1970
2220 REM Finished?
2230 end%=FNfin
2240 IF end%=0 GOTO 1970
2250 ENDPROC
2260 :
2270 DEF PROCscreen
2280 PRINT''indexname$''
2290 FOR A%=1 TO entry%
2300 PRINT file$(A%);TAB(13);
2310 PRINT disctitle$(name%(A%));
2320 PRINT TAB(28);(side$(A%))
2330 NEXT A%
2340 ENDPROC
2350 :
2360 DEF PROCprint
2370 VDU 15,2
2380 PROCscreen
2390 VDU 3
2400 ENDPROC
2410 :
2420 DEF PROCspool
2430 CLS
2440 PROCdrive:PROCspace
2450 VDU 15
2460 *DR.0
2470 spoolname$="SPOOL S."+MID$(indexna
me$,1,7)
2480 PROCoscli(spoolname$)
2490 PROCscreen
2500 *SPOOL
2510 CLS
2520 PRINT''CHR$(130);"Index spooled";
2530 PRINT" as";CHR$(133);
2540 PRINTMID$(spoolname$,7,9)
2550 PROCspace
2560 ENDPROC
2570 :
2580 DEF PROCwritedata
2590 CLS
2600 PROCdrive:PROCspace
2610 *DR.0
2620 indfilnam$="D."+LEFT$(indexname$,7
)
2630 ch%=OPENOUT(indfilnam$)
2640 PRINT#ch%,disc%,entry%
2650 FOR A%=1 TO disc%
2660 PRINT#ch%,disctitle$(A%)
2670 NEXT A%
2680 FOR A%=1 TO entry%
2690 PRINT#ch%,file$(A%)
2700 PRINT#ch%,name%(A%),side$(A%)
2710 NEXT A%
2720 CLOSE#ch%
2730 CLS
```

Continued ▶

◀ **Disc Indexer program continued**

```
2740 PRINT''CHR$(130);
2750 PRINT"File saved as D.";
2760 PRINTLEFT$(indexname$,7)
2770 PROCspace
2780 ENDPROC
2790 :
2800 DEF PROCswapcat
2810 disc%=disc%+1
2820 PROCtitle(disc%)
2830 PRINTTAB(20);disctitle$(disc%)
2840 ENDPROC
2850 :
2860 DEF PROCoscli(A$)
2870 $line%=A$
2880 X%=line% MOD 256
2890 Y%=line% DIV 256
2900 CALL oscli%
2910 ENDPROC
2920 :
2930 DEF PROCdouble(A$)
2940 FOR A%=1 TO 2
2950 PRINTTAB(6,A%);CHR$(141);
2960 PRINTCHR$(131);A$
2970 NEXT A%
2980 ENDPROC
2990 :
3000 DEF PROCspace
3010 PRINT''CHR$(130);"Press";
3020 PRINTCHR$(134);"SPACE";
3030 PRINT CHR$(130);"when ready";
3040 REPEAT UNTIL GET=32
3050 ENDPROC
3060 :
3070 DEF PROCdrive
3080 PRINT''CHR$(130);
3090 PRINT"Put disc in drive";
3100 PRINTCHR$(134);"0"
3110 ENDPROC
3120 :
3130 DEF PROCerror
3140 ON ERROR OFF
3150 CLOSE#0:VDU 3
3160 *SPOOL
3170 REPORT:PRINT " at line ";ERL
3180 PROCspace
3190 ENDPROC
```

**See Calling all computers, page 99**

**Listing 1. Receiver program**

```
   10 REM RS232 Binary File Transfer
   20 REM for BBC/B+/E/M/C
   30 REM (Receiver)
   40 REM by Dave Atherton
   50 REM (c) Acorn User January 1987
   60 :
   70 DIM B% 30,M% T%,U% &100,gbuf &20
   80 CLOSE#0
   90 *FX 15
  100 *FX 7,8
  110 *FX 8,8
  120 *FX 2,2
  130 *FX 3,0
  140 T%=&100
  160 osfile=&FFDD:osgbpb=&FFD1:osbyte=&
FFF4
  170 char=&80:carry=&81:csum=0
  180 :
```

**Continued ▶**

◀ **Receiver program continued**

```
  190 PRINT"Acorn User RS232 receiver"
  200 PRINTSTRING$(25,"=")
  210 PROCassem
  220 REPEAT
  230 PRINT'"Waiting for file header"'
  240 gbuf!9=0
  250 PROCreceive(B%,26)
  260 PROCopenfile
  270 PROCcs
  280 gbuf!9=0
  290 PROCtransfer(F$)
  300 PROCsetattr
  310 PRINTF$;" transferred"
  320 UNTIL FALSE
  330 END
  340 :
  350 DEF PROCopenfile
  360 B%?27=13:F$=$(B%+&10):S%=!B%:E%=B%
!4:L%=B%!8:Z%=B%!12
  370 IF ASC RIGHT$(F$,1)< 33 F$=LEFT$(F
$,LENF$-1):GOTO 370
  380 PRINT"Opening file called ";F$;" (
";(L% DIV T%)+1;" blocks)"
  390 ch=OPENOUT F$:CLOSE #ch
  400 ENDPROC
  410 :
  420 DEF PROCsetattr
  430 !B%=B%+&12:B%!2=S%:B%!6=E%:B%!10=L
%:B%!14=Z% OR 3
  440 $(B%+&12)=F$:X%=B%:Y%=X% DIV &100:
A%=1:CALL osfile
  450 PRINT"Setting attributes on ";F$
  460 ENDPROC
  470 :
  480 DEF PROCreceive(addr,n)
  490 xoff=0:csum=0
  500 IF n=0 GOTO 590
  510 FOR I%=addr TO addr+n-1
  520 CALL get
  530 ?I%=?char:csum=csum+?char
  540 oldx=xoff
  550 IF ADVAL(-2)>150 xoff=TRUE
  560 IF ADVAL(-2)<10 xoff=FALSE
  570 IF oldx<>xoff PROConoff(xoff)
  580 NEXT
  590 ENDPROC
  600 :
  610 DEF PROCtransfer(n$)
  620 ch=OPENUP n$
  630 gbuf!9=0
  640 blks=L% DIV T%
  650 IF blks=0 THEN W%=1:GOTO 720
  660 FOR W%=1 TO blks
  670 PRINT"Receiving block ";W%-1
  680 PROCreceive(M%,T%)
  690 PROCgbpb(M%,T%)
  700 PROCcs
  710 NEXT
  720 PRINT"Receiving block ";W%-1;" (F)
"
  730 PROCreceive(M%,L%-(blks*T%))
  740 PROCgbpb(M%,L%-(blks*T%))
  750 PROCcs
  760 CLOSE #ch
  770 ENDPROC
  780 :
  790 DEF PROCgbpb(addr,n)
  800 LOCAL A%,X%,Y%
  810 ?gbuf=ch:gbuf!1=addr:gbuf!5=n
  820 A%=1:X%=gbuf:Y%=X%DIV&100:CALLosgb
pb:ENDPROC
  830 :
```

**Continued ▶**

**◀ Listing 1. Receiver program continued**

```
 840 DEF PROConoff(n)
 850 LOCAL Y%
 860 IF n THEN Y%=19 ELSE Y%=17
 870 A%=138:X%=2:CALLosbyte
 880 IF n PRINT "Hold transmission" ELS
E PRINT "Restart transmission"
 890 ENDPROC
 900 :
 910 DEF PROCcs
 920 A%=138:X%=2:Y%=ASC"C":CALLosbyte
 930 Y%=csum:CALLosbyte
 940 ENDPROC
 950 :
 960 DEF PROCassem
 970 FOR pass=0 TO 2 STEP2:P%=U%
 980 [opt pass
 990 .get
1000 LDA #145
1010 LDX #1
1020 JSR osbyte
1030 BCS get2
1040 STY char
1050 RTS
1060 .get2
1070 LDY #&FF
1080 LDX #&8F
1090 LDA #&81
1100 JSR osbyte
1110 CPX #&FF
1120 BNE get
1130 RTS
1140 ]
1150 NEXT:ENDPROC
```

**Listing 2. Transmitter program for serial transfer**

```
  10 REM RS232 Binary File Transfer
  20 REM for BBC/B+/E/M/C
  30 REM (Transmitter)
  40 REM by Dave Atherton
  50 REM (c) Acorn User January 1987
  60 :
  70 CLOSE#0
  80 *FX 15
  90 *FX 7,8
 100 *FX 8,8
 110 *FX 2,2
 120 *FX 3,0
 130 T%=&100
 140 DIM D T%,B% &100,M% &100,gbuf &20
 150 DIM fname &20,fnstr &10
 160 FOR I%=fname TO fname+11:?I%=0:NEX
T
 170 osfile=&FFDD:osgbpb=&FFD1:osbyte=&
FFF4
 180 char=&80:carry=&81:xoff=FALSE
 190 :
 200 PROCassem
 210 PRINT"Acorn User RS232 transmitter
"
 220 PRINTSTRING$(29,"=")
 230 REPEAT
 240 INPUT'"Input filename : " F$
 250 IF ASC F$=42 THEN $&C00=F$:X%=0:Y%
=&C:CALL&FFF7:GOTO 240
 260 PROCsetSLE(F$)
 270 gbuf!9=0
 280 PROCsend(B%,26)
 290 gbuf!9=0
 300 PROCtransfer(F$)
```

Continued ▶

**◀ Listing 2. Transmitter program continued**

```
 310 UNTIL FALSE
 320 END
 330 :
 340 DEF PROCsetSLE(F$)
 350 $(B%+&10)=F$:!B%=B%+&10
 360 PRINT"Reading file attributes for
";F$
 370 X%=B%:Y%=X% DIV &100:A%=5:CALL osf
ile
 380 S%=B%!2:E%=B%!6:L%=B%!10:Z%=B%!14
 390 !B%=S%:B%!4=E%:B%!8=L%:B%!12=Z%
 400 $(B%+&10)=LEFT$(F$+STRING$(10," ")
,10)
 410 ENDPROC
 420 :
 430 DEF PROCtransfer(n$)
 440 LOCAL V%,I%
 450 ch=OPENIN n$
 460 blks=L% DIV T%
 470 IF blks=0 I%=1:GOTO 520
 480 FOR I%=1 TO blks
 490 PRINT"Transferring block ";I%-1
 500 V%=FNgbpb(D,T%):PROCsend(D,T%)
 510 NEXT
 520 PRINT"Transferring block ";I%-1;"
(F)"
 530 V%=FNgbpb(D,L%-blks*T%)
 540 PROCsend(D,L%-blks*T%)
 550 CLOSE#ch
 560 ENDPROC
 570 :
 580 DEF FNgbpb(addr,n)
 590 ?gbuf=ch:gbuf!1=addr:gbuf!5=n
 600 A%=3:X%=gbuf:Y%=X% DIV &100:CALL g
bpb2
 610 =-(?carry)
 620 :
 630 DEF PROCsend(addr,N%)
 640 LOCAL I%:csum=0
 650 IF N%=0 GOTO 750
 660 FOR I%=addr TO addr+N%-1
 670 J%=0
 680 REPEAT:J%=J%+1:CALL g:UNTIL ?carry
=0 OR J%=2
 690 IF ?char=17 xoff=FALSE:PRINT"Trans
mission restarted"
 700 IF ?char=19 xoff=TRUE:PRINT"Transm
ission held"
 710 IF xoff GOTO 670
 720 A%=138:X%=2:Y%=?I%:CALLosbyte
 730 csum=csum+?I%
 740 NEXT
 750 csum=csum AND &FF
 760 REPEAT
 770 CALL g:IF ?carry GOTO 770
 780 UNTIL?char=ASC"C"
 790 CALL g:IF ?carry GOTO 790
 800 IF ?char<>csum PRINT"Checksum erro
r - End":END
 810 ENDPROC
 820 :
 830 DEF PROCassem
 840 FOR pass=0 TO 2 STEP 2:P%=M%
 850 [opt pass
 860 .g
 870 LDA #145
 880 LDX #1
 890 JSR osbyte
 900 BCS empty
 910 STY char
 920 LDA #0
```

Continued ▶

**◀ Listing 2. Transmitter program continued**

```
 930 STA carry
 940 RTS
 950 .empty
 960 LDA #&FF
 970 STA carry
 980 STA char
 990 RTS
1000 .gbpb2
1010 JSR osgbpb
1020 BCS over2
1030 LDA #0
1040 .gbpb3
1050 STA carry
1060 RTS
1070 .over2
1080 LDA #1
1090 BNE gbpb3
1100 ]
1110 NEXT
1120 ENDPROC
```

See Recurring Nightmares, page 108

**Listing 1. Five demonstration screens**

```
  10 REM Castle of NM; 5 demo screens
  20 REM By Mark de Weger
  30 REM For BBC B/B+/M/C/E
  40 REM (c) Acorn User  January 1987
  50 :
  60 MODE 6
  70 PROCinit
  80 PRINT''"Screen save completed."
  90 VDU 7:END
 100 :
 110 DEF PROCinit
 120 DIM buffer 255
 130 oscli=&FFF7
 140 PRINT 'SPC(5)"Castle of Nightmares
 II"'
 150 PRINT SPC(7)" by Mark de Weger"
 160 PRINT '''" Creating new screens A-
E:"'
 170 FOR screen=65 TO 69
 180 fn$=CHR$(screen)
 190 PRINT SPC(3)"Saving screen :";fn$
 200 fn$="S."+fn$
 210 PROCpoke
 220 PROCexpand
 230 PROCsave
 240 NEXT
 260 ENDPROC
 270 :
 280 DEF PROCpoke
 290 RESTORE (680+(screen-65)*200)
 300 sum%=0
 310 READ title$
 320 FOR loop%=0 TO 51
 330 READ data$
 340 !(&B00+loop%*4)=EVAL("&"+data$)
 350 sum%=sum%+EVAL("&"+data$)
 360 NEXT loop%
 370 READ data$
 380 checksum%=EVAL("&"+data$)
 390 IF sum%<>checksum%:PRINT '"Checksu
m error in data of screen"'title$:END
 400 ENDPROC
 410 :
 420 DEF PROCexpand
```

Continued ▶

**◀ Recurring Nightmares listing 1 continued**

```
 430 FOR loop%=&199 TO 1 STEP -2
 440 loop%?&B00=?(&B00+(loop%-1)/2) DIV
16
 450 loop%?&AFF=?(&B00+(loop%-1)/2) MOD
16
 460 NEXT loop%
 470 addr%=&8FF
 480 FOR y%=0 TO 23
 490 FOR x%=0 TO 16
 500 addr%=addr%+1
 510 ?addr%=?(&B00+x%+y%*17)
 520 NEXT x%
 530 addr%=addr%+3
 540 NEXT y%
 550 $&AE1=title$
 560 ENDPROC
 570 :
 580 DEF PROCsave
 590 PROCoscli("SAVE "+fn$+" 900 +1FF")
 600 ENDPROC
 610 :
 620 DEF PROCoscli($buffer)
 630 X%=buffer MOD 256
 640 Y%=buffer DIV 256
 650 CALL oscli
 660 ENDPROC
 670 :
 680 DATA "ROOM 101"
 690 DATA 2002222,60020020,6007
 700 DATA 10000000,60016,0
 710 DATA 600060,70000,6560607
 720 DATA 55555607,60602222,6111
 730 DATA 6000000,60006,7000000
 740 DATA 600060,62600A09,6000670
 750 DATA 6005526,25552226,62000062
 760 DATA 660,600,6006
 770 DATA 906000,6A060,11110000
 780 DATA A611600,0,61006100
 790 DATA 6303,60000,7060006
 800 DATA 600000,11600060,6055551
 810 DATA 6070605,60000000,60222000
 820 DATA 0,6,6
 830 DATA 60,9060,70600
 840 DATA 44222600,444444,6090
 850 DATA 10000000,11111,0
 860 DATA FF,E80B20C2,504153
 870 :
 880 DATA "THE TOWER"
 890 DATA 22222222,6002222,0
 900 DATA 60000000,0,0
 910 DATA 9070006,7,26200060
 920 DATA 1016022,600001A1,11160000
 930 DATA 1111,10600006,1111
 940 DATA 6000060,11111,62332600
 950 DATA 10100,6070,171006
 960 DATA 62200,1110060,600A00
 970 DATA 11162200,6002260,11600000
 980 DATA 60000601,16000000,6010
 990 DATA 60909086,60171,22220220
1000 DATA 601116,600,6011160
1010 DATA 6A00,22111600,63002
1020 DATA 1116000,44600000,11160044
1030 DATA 0,1600000,1
1040 DATA 16000000,10,60000700
1050 DATA 10090101,11111111,11111111
1060 DATA 600FF,ED45405A,53574F
1070 :
1080 DATA "MUMMY!"
1090 DATA 65050522,0,7
1100 DATA 40007006,44,11111160
1110 DATA 1,0,10
1120 DATA 0,A00100,90000
```

Continued ▶

◀ Recurring Nightmares listing 1 continued

```
1130 DATA 6801000,60226060,66226000
1140 DATA 60600,60060006,606006
1150 DATA 600060,6060966,600060A
1160 DATA 60622667,60006022,6006622
1170 DATA 60006,60060006,600060
1180 DATA 600060,6007606,6000609
1190 DATA 60226060,10006022,11111111
1200 DATA 61111111,0,0
1210 DATA 6,0,A060
1220 DATA 7007,110600,110011
1230 DATA 6011,0,60000
1240 DATA 0,600000,900000
1250 DATA 16000070,11111111,11111111
1260 DATA 60000FF,4506B46A,524443
1270 :
1280 DATA "THE TREE"
1290 DATA 33332222,16222444,0
1300 DATA 60000000,70000000,7000
1310 DATA 16000006,11116111,60000016
1320 DATA 60000,A00060,600006
1330 DATA 55700600,6000922,5522000
1340 DATA 60002200,22000,220000
1350 DATA 22900,22000000,22008
1360 DATA 700A00,22622,2226A09
1370 DATA 6000,20066222,60002
1380 DATA 660022,600220,6600022
1390 DATA 6022000,66000022,62200709
1400 DATA 60700022,2222,22200006
1410 DATA 7226002,62200060,22060000
1420 DATA 2270600,600006,2206022
1430 DATA 6000060,2262200,600
1440 DATA 600000,0,6090700
1450 DATA 17077700,11111111,15555511
1460 DATA 20000FF,DCBE4E56,4F464E
1470 :
1480 DATA "THE MAZE"
1490 DATA 62222222,622A000,0
1500 DATA 60220006,7000600,60
1510 DATA 60006655,63333,66000
1520 DATA 63600006,61160070,7060
1530 DATA 622206,6555556,6000067
1540 DATA 60600060,60001111,70600
1550 DATA 60060006,262672,4460006A
1560 DATA 60606506,2222,6060060
1570 DATA 60006,60600600,33600060
1580 DATA 6A06063,6001161,62060600
1590 DATA 60000600,606000,70006006
1600 DATA 6022606,9060060,60006111
1610 DATA 22220620,60000,606006
1620 DATA 90607006,6760060,22026260
1630 DATA 22600622,60060000,6006000
1640 DATA 10600000,60060001,6090900
1650 DATA 10607000,11111116,6111001
1660 DATA 60006FF,158A7C50,4D4D
```

Listing 2. Castle of Nightmares data spooler

```
 10 REM Castle of NM data spooler
 20 REM By Mark de Weger
 30 REM For BBC B/B+/M/MC/E
 40 REM (c) Acorn User  January 1987
 50 :
 60 MODE 7
 70 PROCinit
 80 PROCcrunch
 90 PROCsave
100 RUN
110 :
```

Continued ▶

◀ Recurring Nightmares listing 2 continued

```
 120 DEF PROCinit
 130 ON ERROR CLOSE #0:PRINT:REPORT:PRI
NT" at line ";ERL:END
 140 DIM buffer 255
 150 oscli=&FFF7
 160 PRINT '"CASTLE OF NIGHTMARES DATA
SPOOLER"
 170 PRINT '"by Mark de Weger"'
 180 *CAT
 190 PRINT '"Input filename: S.";
 200 fn$=GET$
 210 PRINT fn$
 220 fn$="S."+fn$
 230 PROCoscli("LOAD "+fn$+" 900")
 240 ENDPROC
 250 :
 260 DEF PROCcrunch
 270 addr%=&8FF
 280 FOR y%=0 TO 23
 290 FOR x%=0 TO 16
 300 addr%=addr%+1
 310 ?(&B00+x%+y%*17)=?addr%
 320 NEXT x%
 330 addr%=addr%+3
 340 NEXT y%
 350 FOR loop%=0 TO &198 STEP 2
 360 ?(&B00+loop%/2)=loop%?&B00+(loop%?
&B01)*16
 370 NEXT loop%
 380 ENDPROC
 390 :
 400 DEF PROCsave
 410 INPUT '"Output filename: "fn$
 420 INPUT "Start line number: "ln%
 430 PROCoscli("SPOOL "+fn$)
 440 PRINT ln%;"DATA """;$&AE1;"""";
 450 sum%=0
 460 FOR loop%=&B00 TO &BCC STEP 4
 470 sum%=sum%+!loop%
 480 IF (loop%+4) MOD 12=0:ln%=ln%+10:P
RINT 'ln%;"DATA ";~!loop%; ELSE PRINT ",
";~!loop%;
 490 NEXT loop%
 500 PRINT ",";~sum%'
 510 PROCoscli("SPOOL")
 520 ENDPROC
 530 :
 540 DEF PROCoscli($buffer)
 550 X%=buffer MOD 256
 560 Y%=buffer DIV 256
 570 CALL oscli
 580 ENDPROC
```

## Blunder box

*As promised in last month's Blunderbox here is the 'Gull' listing which was regretfully omitted from Jonathan Baldwins Super Plotter article, published in our November 1986 issue.*

Listing 1. Draws a gull

```
10 REM This program builds up a file
20 REM which can be *LOADed into
30 REM SUPER-PLOT to draw a gull.
40 REM (c) Acorn User January 1987
50 :
60 PROCchecksum
```

Continued ▶

See Graphic expressions, page 173

◀ Gull listing continued

```
70 PROCbuild
80 *SAVE BIRD 2200 24B0 1900 1900
90 END
100 :
110 DEF PROCchecksum
120 T%=0
130 FOR I%=1 TO 280
140 READ A$:T%=T%+EVAL("&"+A$)
150 NEXT
160 IF T%=23185 ENDPROC
170 PRINT"Checksum Error"
180 END
190 :
200 DEF PROCbuild
210 RESTORE 410
220 PROCdata(&33,&2200)
230 RESTORE 490
240 PROCdata(&33,&2300)
250 RESTORE 570
260 PROCdata(175,&2400)
270 ?&22FF=&33
280 ?&23FF=&2B
290 ENDPROC
300 :
310 DEF PROCdata(N%,S%)
320 D$="&"
330 FOR E%=0 TO N%
340 READ A$
350 D$=D$+A$
360 S%?E%=EVAL(D$)
370 D$="&"
380 NEXT
390 ENDPROC
400 :
410 DATA 0C,0D,0D,0D,0D,0D,0D,0D
420 DATA 0D,0D,0D,0D,0D,0D,0D,0D
430 DATA 0D,0D,0D,0D,0D,0D,0D,0D
440 DATA 0D,0D,0D,0D,0D,0D,0D,0D
450 DATA 0C,0D,0D,0D,0D,0D,0D,0D
460 DATA 0D,0D,0C,0D,0C,0D,0D,0D
470 DATA 0C,0D,0C,0D
480 :
490 DATA 00,01,02,03,04,05,06,07
500 DATA 08,09,0A,0B,0C,0D,0E,0F
510 DATA 10,11,12,13,14,15,16,17
520 DATA 18,19,1A,1B,1C,1D,1E,1F
530 DATA 20,21,22,23,24,25,26,07
540 DATA 27,09,27,20,28,29,2A,28
550 DATA 2B,19,1C,2B
560 :
570 DATA 9D,5D,F7,9C,3D,18,73,39
580 DATA 86,9D,C3,34,7C,77,E5,DD
590 DATA 0F,61,5D,E8,65,0E,C9,92
600 DATA 71,4C,1F,02,3E,70,72,7B
610 DATA 69,7A,A8,AB,90,72,57,65
620 DATA 68,7B,8D,61,FF,FF,FE,FE
630 DATA FE,FF,FF,00,00,00,00,01
640 DATA 01,01,00,00,01,01,01,00
650 DATA 00,00,FF,FF,FF,FF,FF,FF
660 DATA FF,FF,FF,FF,00,00,00,00
670 DATA 00,00,00,00,FF,FF,FF,FF
680 DATA 05,D0,AB,22,38,A4,22,8B
690 DATA 9E,74,22,2F,6D,A2,BD,FA
700 DATA 57,8E,B1,BC,A3,51,48,5C
710 DATA 5B,4D,57,49,37,10,F6,E9
720 DATA 6E,31,1D,0C,09,29,6C,7D
730 DATA 38,42,31,37,00,FF,FF,FF
740 DATA FE,FE,FF,FF,FF,FF,FF,FF
750 DATA FF,FF,FF,FF,00,00,00,00
760 DATA 00,00,00,00,00,00,00,00
770 DATA 00,00,FF,FF,FF,FF,FF,FF
780 DATA FF,FF,FF,FF,00,00,00,00
```

**Listing 1. Plots graphs**

```
10 REM GraPlt
20 REM by Peter Sandford
30 REM for BBC B/B+M/C/E
40 REM (c) Acorn User January 1987
50 :
60 IF PAGE<>&1100 THEN PAGE=&1100:CHA
IN"GRAPLT"
70 :
80 MODE 0
90 PROCinit
100 ON ERROR PROCerror
110 REPEAT
120 CLS:PRINTTAB(18)"Graph Plotting Ut
ility - Enter Option (1-5)"
130 PRINT" 1) Plot Graph  2) Draw Labe
l  3) Load Screen  4) Save Screen  5) Sc
reen Dump";
160 IF K%=1 PROCplotgraph
310 :
320 DEF PROCinit
330 PROCwindow(0):PROCcursoroff:*FX4,1
340 PROCdraw(1,68,1,1023):PROCdraw(1,1
023,1279,1023)
350 PROCdraw(1279,1023,1279,68):PROCdr
aw(1279,68,1,68)
360 PROCwindow(3)
370 cx=640:cy=875
380 DIM osblock 35
390 :
400 a$=STRING$(60," "):an$=a$:mess$=ST
RING$(79," ")
410 VDU 23,48,&663C;&6666;&6666;&3C;
420 ENDPROC
430 :
670 PROCwindow(3)
1870 :
1880 DEF PROCkey(x,y)
1890 PROCdraw(x,y,x+128,y)
1900 PROCplotpoint(x+32,y):PROCplotpoin
t(x+96,y)
1910 VDU 5
1920 MOVE x+144,y+16:PRINT"y="+fn$
1930 VDU 4
1940 ENDPROC
1950 :
1960 DEF PROCplotgraph
1970 plotchar=35
1980 PROCwindow(3):CLG
1990 F%=1
2000 fn$=FNinputstr("Enter function to
be plotted as expression of 'x'",36)
2010 fn$=FNconvertx(fn$)
2020 xmin=FNinput("Minimum value of x "
,-9E5,9E6)
2030 xmax=FNinput("Maximum value of x "
,xmin,9E6)
2040 xint=FNinterval((xmax-xmin)/5)
2050 PROCymaxmin
2060 yint=FNinterval((ymax-ymin)/5)
2070 ymin=yint*INT(ymin/yint)
2080 ymax=yint*INT(ymax/yint+1)
2090 PROCdrawaxes
2100 REPEAT
2110 PROCredefine(F%)
2120 PROCplotline(xmin,xmax)
2130 FOR val=xmin TO xmax STEP xint/2
2140 PROCplotpoint(FNxc(val),FNyc(val))
2150 NEXT val
2160 PROCkey(480,808+36*F%)
2170 F%=F%+1
2180 IF F%<=5 THEN yn$=FNget("Do you wa
nt to plot another function on these axe
```

Continued ▶

◀ Graph plotting listing continued

```
s (Y/N)?","YN"):IF yn$="Y" THEN fn$=FNin
putstr("Enter new function",36):fn$=FNco
nvertx(fn$)
 2190 UNTIL F%>5 OR yn$="N"
 2200 ENDPROC
 2210 :
 2220 DEF PROCplotline(x1,x2)
 2230 oldx=FNxc(x1):oldy=FNyc(x1)
 2240 FOR x1=x1 TO x2 STEP 4/xscale
 2250 newx=FNxc(x1):newy=FNyc(x1)
 2260 PROCdraw(oldx,oldy,newx,newy)
 2270 oldx=newx:oldy=newy
 2280 NEXT
 2290 ENDPROC
 2300 :
 2310 DEF PROCplotpoint(x,y)
 2320 VDU 5
 2330 MOVE x+16,y+16:VDU 127,127
 2340 MOVE x-8,y+8
 2350 PRINT CHR$(plotchar)
 2360 VDU 4
 2370 ENDPROC
 2380 :
 2390 DEF FNxc(x)
 2400 =yaxis+(x+xdisp)*xscale
 2410 :
 2420 DEF FNyc(x)
 2430 =xaxis+(EVAL(fn$)+ydisp)*yscale
 2440 :
 2450 DEF PROCymaxmin
 2460 x=xmin:ymin=EVAL(fn$):ymax=ymin
 2470 FOR x=xmin TO xmax STEP (xmax-xmin
)/40
 2480 y=EVAL(fn$)
 2490 IF y<ymin ymin=y
 2500 IF y>ymax ymax=y
 2510 NEXT
 2520 ENDPROC
 2530 :
 2540 DEF FNinterval(int)
 2550 exp=FNexp(int)
 2560 int=int/10^exp
 2570 IF int<2.5 int=1 ELSE IF int>=7.5
int=10 ELSE int=5
 2580 =int*10^exp
 2590 :
 2600 DEF FNexp(N)
 2610 LOCAL @%
 2620 @%=&1010209
 2630 a$=STR$(N)
 2640 =VAL(RIGHT$(a$,LEN(a$)-INSTR(a$,"E
")))
 2650 :
 2660 DEF PROCdrawaxes
 2670 LOCAL @%
 2680 xscale=920/(xmax-xmin)
 2690 yscale=600/(ymax-ymin)
 2700 yaxis=180-xscale*xmin:xdisp=0
 2710 xaxis=200-yscale*ymin:ydisp=0
 2720 IF xmax<0 yaxis=180:xdisp=-xmin
 2730 IF xmin>0 yaxis=1100:xdisp=-xmax
 2740 IF ymin>0 xaxis=200:ydisp=-ymin
 2750 IF ymax<0 xaxis=800:ydisp=-ymax
 2760 PROCdraw(yaxis,800,yaxis,200)
 2770 PROCdraw(180,xaxis,1100,xaxis)
 2780 VDU 5
 2790 exp=FNexp(xint)
 2800 IF exp<0 @%=&1020009-&100*exp ELSE
@%=&1000009
 2810 FOR val=xmin TO xmax STEP xint
 2820 x=FNxc(val)
 2830 a$=STR$(val)
```

Continued ▶

◀ Graph plotting listing continued

```
 2840 MOVE x-8*(LEN(a$)),186
 2850 PRINT a$
 2860 PROCdraw(x,xaxis-8,x,xaxis+8)
 2870 FOR Y%=200 TO 800 STEP 16
 2880 PLOT 69,x,Y%
 2890 NEXT
 2900 NEXT val
 2910 exp=FNexp(yint)
 2920 IF exp<0 @%=&1020009-&100*exp ELSE
@%=&1000009
 2930 FOR val=ymin TO ymax STEP yint
 2940 y=xaxis+(val+ydisp)*yscale
 2950 a$=STR$(val)
 2960 IF yaxis<650 MOVE 164-16*LEN(a$),y
+16 ELSE MOVE 1112,y+16
 2970 PRINT a$
 2980 PROCdraw(yaxis-8,y,yaxis+8,y)
 2990 FOR X%=180 TO 1100 STEP 24
 3000 PLOT 69,X%,y
 3010 NEXT
 3020 NEXT val
 3030 VDU 4
 3040 ENDPROC
 3050 :
 3060 DEF FNconvertx(a$)
 3070 FOR L%=1 TO LEN(a$)
 3080 IF MID$(a$,L%,1)="X" AND MID$(a$,L
%-1,3)<>"EXP" THEN a$=LEFT$(a$,L%-1)+"x"
+RIGHT$(a$,LEN(a$)-L%)
 3090 NEXT
 3100 =a$
```

See Acorn Forum, page 193

**Listing 1. Using all 16 soft keys**

```
  10 REM FunCurse
  20 REM by Sebastian Lazareno
  30 REM for BBC B/B+/M/C
  40 REM Acorn User January 1987
  50 :
  60 MODE 7
  70 DIM X% 50
  80 PROCass
  90 PROCcheck
 100 PROCdemo
 110 END
 120 :
 130 DEF PROCass
 140 insv=&22A
 150 FOR pass=0 TO 2 STEP 2
 160 P%=&900
 170 [OPT pass
 180 .code
 190 LDA #start DIV256
 200 CMP insv+1
 210 BNE init
 220 LDA #start MOD256
 230 CMP insv
 240 BEQ start-1
 250 .init
 260 LDA insv
 270 STA oldinsv
 280 LDA insv+1
 290 STA oldinsv+1
 300 LDA #(start MOD 256)
 310 STA insv
 320 LDA #(start DIV 256)
 330 STA insv+1
 340 RTS
```

Continued ▶

◀ Listing 1 continued

```
350 .start
360 PHP
370 PHA
380 CPX #0
390 BNE softoff
400 CMP #&BB
410 BEQ routineoff
420 CMP #&AB
430 BEQ routineon
440 LDY routineflag
450 BEQ softoff
460 LDY statusflag
470 BNE active
480 LDY &272
490 STY oldsoft
500 LDY &27D
510 STY oldcur
520 .active
530 CMP #9
540 BNE nextest
550 LDA &25A
560 AND #8
570 BEQ end
580 PLA
590 LDA #&9A
600 PHA
610 .nextest
620 CMP #&A0
630 BCS softoff
640 CMP #&9A
650 BCC softoff
660 LDA #2
670 STA &27D
680 LDA #1
690 STA &272
700 STA statusflag
710 BNE end
720 .routineoff
730 LDA #0
740 STA routineflag
750 BEQ softoff
760 .routineon
770 STA routineflag
780 PLA
790 LDA #0
800 PHA
810 .softoff
820 LDA oldcur
830 STA &27D
840 LDA oldsoft
850 STA &272
860 LDA #0
870 STA statusflag
880 .end
890 PLA
900 PLP
910 OPT FNequb(&4C)
920 .oldinsv
930 NOP
940 NOP
950 .oldsoft
960 NOP
970 .oldcur
980 NOP
990 .statusflag
1000 BRK
1010 .routineflag
1020 NOP
1030 ]
1040 NEXT
1050 ENDPROC
1060 :
```

Continued ▶

◀ Listing 1 continued

```
1070 DEF FNequb(A):?P%=A:P%=P%+1:=pass
1080 :
1090 DEF PROCcheck
1100 T%=0
1110 FOR I%=code TO P%-1
1120 T%=T%+?I%
1130 NEXT
1140 IF T%=16017 ENDPROC
1150 PRINT"Checksum Error!":VDU7
1160 END
1170 :
1180 DEF PROCdemo
1190 CALL code
1200 Y%=X% DIV 256
1210 A$=CHR$&F4+"|H"
1220 FOR I%=10 TO 15
1230 $X%="K."+STR$I%+""""+A$+"*KEY "+ST
R$I%+"|M"""
1240 CALL&FFF7
1250 NEXT
1260 PRINT'"Keys 10 - 15 ready for edit
ing"
1270 PRINT'"Key  10        = Shift Tab"
1280 PRINT"Key  11        = Shift Copy"
1290 PRINT"Keys 12 to 15 = Shift Cursor
 Keys"
1300 PRINT'"Turn off with Shift+Ctrl+Co
py"
1310 PRINT"Turn on again with Ctrl+Copy
"
1320 END
```

**Listing 3. Simulating Basic 2 assembler functions**

```
10 REM EQU for BASIC 1
users
20 REM by Chris Dunley
30 REM for BBC with BAS
IC 1 only
40 REM (c) Acorn User J
anuary 1987
50 :
60 PROCassemble
70 PROCchecksum
80 END
90 :
100 DEF PROCassemble
110 R%=&900
120 FOR pass%=0 TO 2 STE
P 2
130 P%=R%
140 [OPT pass%
150 LDY #&00
160 LDA (&FD),Y
170 \ Check for Syntax E
rror
180 CMP #16
190 BNE nogood
200 \ Are we in assemble
r?
210 LDA &28
220 BMI nogood
230 LDY &A
240 DEY
250 DEY
260 DEY
270 :
```

Continued ▶

◄ Listing 3 continued

```
  280 \ Check for EQU opco
de
  290 LDX #0
  300 .loop
  310 LDA (&B),Y
  320 \ Restore to upper c
ase
  330 AND #&DF
  340 CMP table,X
  350 BNE nogood
  360 INY
  370 INX
  380 CPX #3
  390 BNE loop
  400 :
  410 LDA (&B),Y
  420 INY
  430 STY &A
  440 AND #&DF
  450 CMP #ASC("S")
  460 BEQ string
  470 LDX #1
  480 CMP #ASC("B")
  490 BEQ int
  500 INX
  510 CMP #ASC("W")
  520 BEQ int
  530 INX
  540 INX
  550 CMP #ASC("D")
  560 BEQ int
  570 .nogood
  580 JMP (oldvec)
  590 :
  600 \ EQUB, EQUW and EQU
D
  610 :
  620 .int
  630 TXA
  640 PHA
  650 \ Calculate the inte
ger
  660 JSR &87E4
  670 PLA
  680 TAX
  690 STX &36  \Store leng
th of data
  700 DEX
  710 \ Move the integer b
ytes to &600,
  720 \ (This is the strin
g store)
  730 .moveint
  740 LDA &2A,X
  750 STA &600,X
  760 DEX
  770 BPL moveint
  780 BMI move
  790 :
  800 \ EQUS here
  810 :
  820 .string
  830 \ Evaluate the strin
g
  840 JSR &9AF7
  850 BEQ move
  860 \ If not a string, c
ause an error
  870 JMP &8B7E
```

Continued ►

◄ Listing 3 continued

```
  880 .move
  890 LDA &440
  900 STA &37
  910 \ Get P%
  920 LDA &441
  930 STA &38
  940 LDA &36
  950 PHA
  960 STA &3A
  970 LDX #0
  980 LDY #0
  990 :
 1000 \ Move the data to m
emory
 1010 .i
 1020 LDA &600,X
 1030 STA (&37),Y
 1040 INX
 1050 INY
 1060 INC &440
 1070 BNE j
 1080 \ Increment P%
 1090 INC &441
 1100 .j
 1110 DEC &3A
 1120 BNE i
 1130 :
 1140 \ Get the OPT flag
 1150 LDA &28
 1160 \ See if a listing i
s required
 1170 LSR A
 1180 BCC noprint
 1190 LDA &38
 1200 \ Print the address
 - high byte
 1210 JSR &8570
 1220 LDA &37
 1230 \ Print the low byte
 and a space
 1240 JSR &856A
 1250 PLA
 1260 STA &3A
 1270 LDX #0
 1280 .n
 1290 \ Print hex values i
n groups of 3
 1300 LDY #3
 1310 .printstart
 1320 LDA &600,X
 1330 JSR &856A
 1340 DEC &3A
 1350 BEQ quit
 1360 INX
 1370 DEY
 1380 BNE printstart
 1390 :
 1400 \ Print a CR
 1410 JSR &BC42
 1420 LDY #5
 1430 .f
 1440 \ Print 5 spaces
 1450 JSR &B57B
 1460 DEY
 1470 BNE f
 1480 BEQ n
 1490 .quit
 1500 DEY
 1510 BEQ prtend
```

Continued ►

◄ Listing 3 continued

```
 1520 \ Print 3 spaces
 1530 JSR &B57B
 1540 JSR &B571
 1550 JSR &B571
 1560 BNE quit
 1570 .prtend
 1580 PLA
 1590 PLA
 1600 PLA
 1610 JMP &852C
 1620 .noprint
 1630 PLA
 1640 PLA
 1650 PLA
 1660 \ Re-enter assembler
with no text
 1670 JMP &8541
 1680 .table
 1690 ]
 1700 $P%="EQU"
 1710 P%=P%+3
 1720 [OPT pass%
 1730 .oldvec
 1740 ]
 1750 NEXT pass%
 1760 :
 1770 REM Set up the vecto
r
 1780 ?oldvec=?&202:oldvec
?1=?&203
 1790 ?&202=R% MOD 256
 1800 ?&203=R% DIV 256
 1810 *KEY10 "?&202=R% MOD
256:?&203=R% DIV256|M"
 1820 ENDPROC
 1830 :
 1840 DEF PROCchecksum
 1850 total%=0
 1860 FOR byte%=&900 TO &9
D2
 1870 total%=total%+?byte%
 1880 NEXT byte%
 1890 IF total%<>24860 THE
N PRINT "Checksum Error -
please check listing":END
 1900 ENDPROC
```

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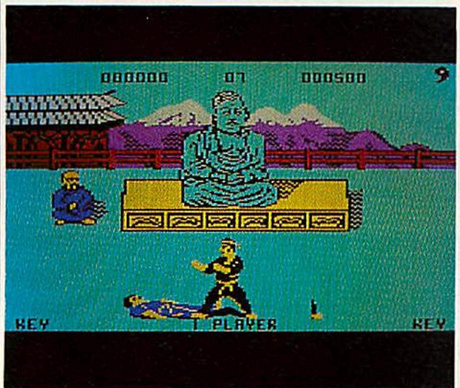
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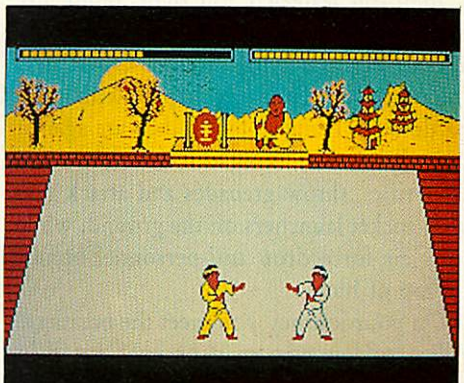
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## TOP 20 BBC MICRO GAMES

| | Title | Publisher | Cassette | Disc | B+ | Master | Reviewed |
|---|---|---|---|---|---|---|---|
| 1 | (–) Kane | Mastertronic | £1.99 | — | No | No | — |
| 2 | (–) Stryker's Run | Superior | £9.95 | £11.95 | Yes | Yes | January '86 |
| 3 | (3) Thrust | Superior | £7.95 | £11.95 | Yes | Yes | — |
| 4 | (2) Psycastria | Audiogenic | £7.95 | £11.95 | Yes | Yes | — |
| 5 | (6) Trivial Pursuit | Domark | £14.95 | £19.95 | Yes | Yes | January '86 |
| 6 | (4) Spy Hunter | US Gold | £9.99 | £14.99 | No | * | — |
| 7 | (13) Commonwealth Games | Tynesoft | £7.95 | £9.95 | Yes | Yes | — |
| 8 | (–) Micropower Magic | Micropower | £7.95 | £7.95 | Yes | Yes | — |
| 9 | (11) Galaforce | Superior | £9.95 | £11.95 | Yes | Yes | December '86 |
| 10 | (–) Vegas Jackpot | Mastertronic | £1.99 | — | Yes | Yes | — |
| 11 | (14) Winter Olympics | Tynesoft | £9.95 | — | * | * | September '86 |
| 12 | (–) Jet Set Willy | Software Projects | £7.95 | £9.95 | Yes | Yes | — |
| 13 | (–) Phantom Combat | Doctorsoft | £9.95 | £11.95 | Yes | Yes | February '86 |
| 14 | (–) Karate Combat | Superior | £8.95 | £11.95 | Yes | Yes | July '86 |
| 15 | (7) Commando | Elite | £9.95 | £14.95 | * | * | August '86 |
| 16 | (–) Bug Eyes 2 | Audiogenic | £7.95 | — | Yes | Yes | — |
| 17 | (8) Air Wolf | Elite | £9.95 | £14.95 | Yes | Yes | — |
| 18 | (18) Raid Over Moscow | Access-US Gold | £9.99 | — | * | * | November '86 |
| 19 | (–) Computer Hits 10 | Beau Jolly | £9.95 | — | Yes | No | — |
| 20 | (–) League Challenge | Atlantis | £2.99 | — | Yes | * | — |


Fists Exploding again at Electron number 6


Galaforce: Superior's shoot 'em up is at 9


Karate Combat: another oriental fight at 14

## TOP 10 ELECTRON GAMES

| | Title | Publisher | Cassette | Disc | Reviewed |
|---|---|---|---|---|---|
| 1 | (–) Micropower Magic | Micropower | £7.95 | — | — |
| 2 | (–) Vegas Jackpot | Mastertronic | £1.99 | — | — |
| 3 | (5) Galaforce | Superior | £9.95 | £11.95 | December '86 |
| 4 | (1) Commonwealth Games | Tynesoft | £7.95 | £9.95 | — |
| 5 | (–) The Way of the Exploding Fist | Melbourne House | £9.95 | — | April '86 |
| 6 | (–) Quest For Freedom | IJK | £1.99 | — | — |
| 7 | (2) Galactic Patrol | Mastertronic | £1.99 | — | — |
| 8 | (–) Ian Botham's Test Cricket | Tynesoft | £7.95 | £11.95 | — |
| 9 | (–) League Challenge | Atlantis | £2.99 | — | — |
| 10 | (–) Strike Force Harrier | Mirrorsoft | £9.95 | £12.95 | January '86 |

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# REVIEWS

## GAMES

### FIRST STRYKE

**Stryker's Run from Superior Software, BBC micro & Master disc costs £11.95, tape £9.95, Master Compact disc is £14.95**

*Stryker's Run* is the latest blockbuster from Superior Software, and is of the usual high standard. It is the first commercial game to feature a version specifically for the Master series, but playing in both cases is exactly the same. The Compact version is the same as for the Master, but on the 3.5in disc.

You control the character called Commander John Stryker and must help him deliver the top secret documents to the Allies' HQ. The background of the game revolves around the war between the Allies and the Volgans and at this vital moment in the battle, you have been given the gruelling task of taking some of the captured Volgan battle-plans to your HQ.

John can walk left and right, jump, fire his gun, throw grenades and board any aircraft he finds lying around. Obviously, the Volgans aren't very happy with their battle-plans being stolen so they are against you all the way. Volgan foot-soldiers fire laser rifles, throw grenades and attack you with rocket launchers on the ground, while their air force drop anti-personnel bombs on top of him.

On your journey you meet the occasional Allied soldier who may or may not help you in your personal battle against the Volgans. Boarding aircraft enables you to shoot down Volgan planes or bomb soldiers on the ground, but when you are airborne, SAM missiles fire up towards you, the enemy planes shoot at you and you have limited fuel! Oh well, maybe it would be easier to walk . . .

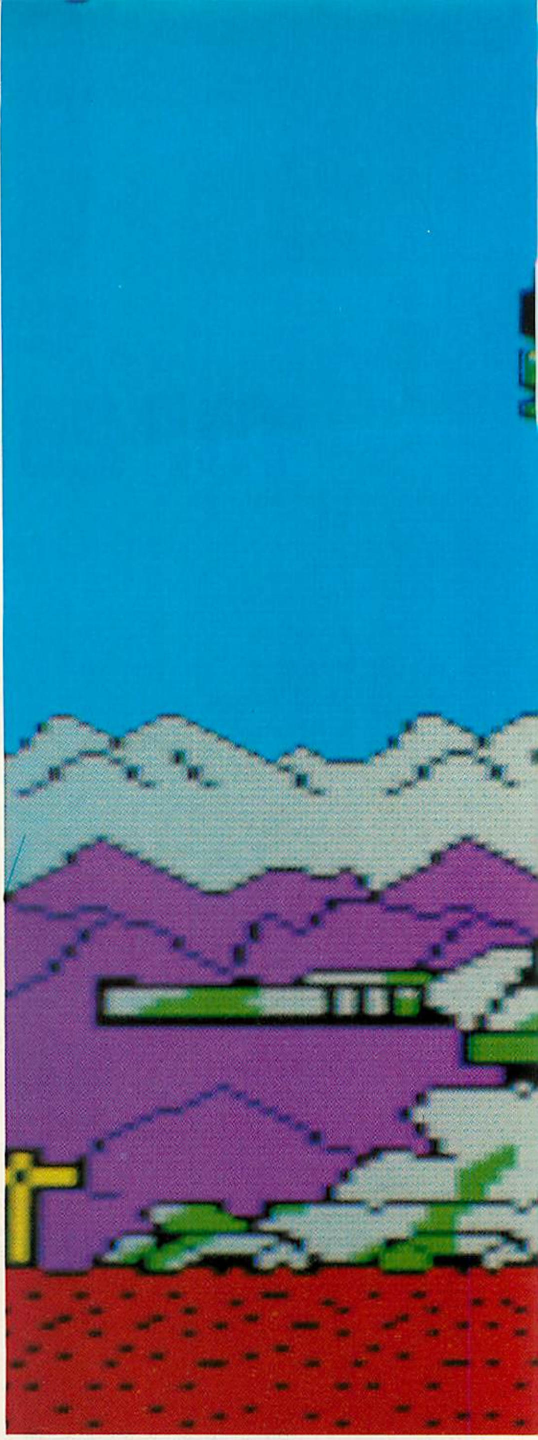
The pictures on this page, except for one, were taken from the Master version of the game, so all BBC micro owners out there can see what they are missing. The Master version is called an 'enhanced' version and that really is all it is; shadow memory and the four sideways RAM banks are used to store 40k of extra graphics, a catchy tune and a scrolling information message.

It is interesting to note that both Master and BBC model B versions are supplied on the same disc or tape, ready for when you upgrade to a Master. Features common to both versions are a very cute animation when you or an enemy are killed and a secret message that appears when you reach the HQ. If you send this word into Superior Software before March 31 you can win a remote-controlled car.

To be honest, apart from the absolutely excellent graphics, I wasn't too impressed with this game. The sprites are not totally flicker-free, the action is hardly what you would call fast and on the whole, nothing much seems to happen. Especially on the BBC micro, 'holding down right' tends to be the most demanding thing you do. The game also gets very difficult as, like a cat, you have nine lives and these tend to disappear rapidly if you happen to stand in the wrong place under an enemy plane.

Needless to say, I have finished the game and recommend it to any Master owner despite these criticisms. I would not, however, recommend the BBC micro version as highly, since the extra graphics are really needed to make the game playable.

David Lawrence



**Main picture: Commander John Stryker takes on a Volgan army installation single-handed**

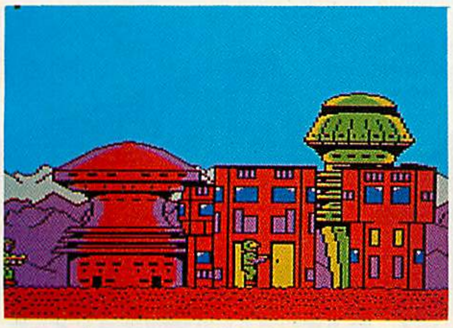


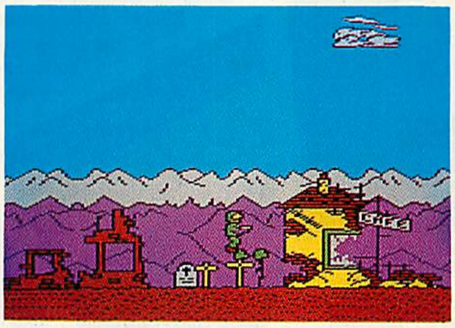
**Left to right: the opening screen of the BBC micro version; ditto for the Master; Commander Stryker pauses for a cup of tea; then takes to the air to challenge a Volgan chopper**

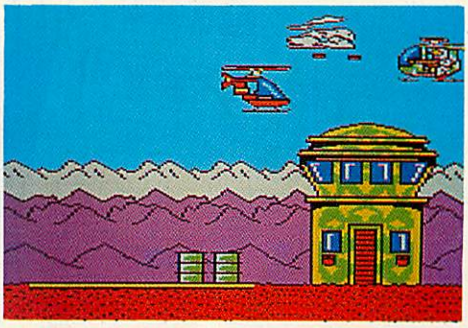


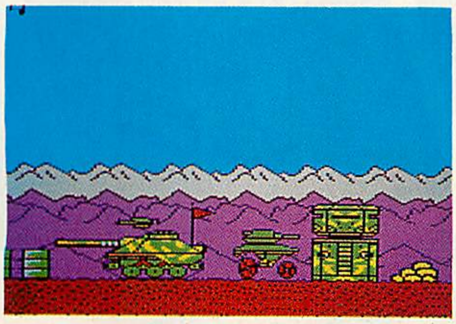
**More challenges (left to right): a Volgan stronghold disguised as Mt Rushmore; a squadron of artillery; the camouflaged battle fortress; final destination – allied HQ**

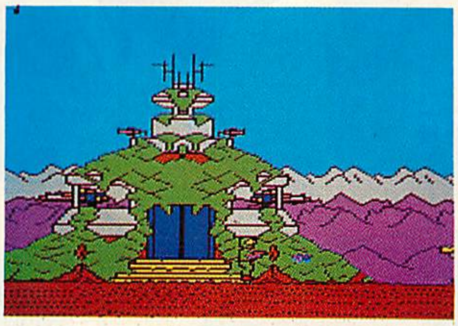














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GAMES

# THE GAMES PAGE

**David Lawrence launches his regular feature with a roundup of the latest releases, and something useful for *Repton* junkies**

The Games Page will be a new *Acorn User* regular feature. It will centre around news of releases in the games world, but will also carry readers' letters, the highest scores table, hints and tips for arcade and adventure games and occasional special features.

Reviews of the latest 'mega games', *The Sentinel, Repton 3* and *Stryker's Run,* appear on other pages, but there are plenty of other recent releases. *Sink the Bismark* from Design People Software places you in control of a formidable fleet of some of Britain's greatest battleships, with which you must seek and destroy the latest German threat, the Bismark. This game is very well put together with some nice graphics and a good plot. The disc is compatible with BBC and Master and costs £11.99.

Audiogenic, a previously fairly small software house, have released three arcade adventures. In *The Last of The Free,* you control a small robot who must run around a large number of rooms solving the puzzles with the final aim of returning to Earth. *Thunderstruck* gives you control of the spacesuited character Spreco who, similarly, must run around a large number of rooms solving puzzles with the final aim of returning to .... Myrtle and the kids! The action takes place in a haunted Medieval castle, complete with dungeons and a lift. *Thunderstruck II: The MindMaster* is the sequel to Thunderstruck and Spreco takes the leading role again. But just for a change, you must run around a large number of rooms solving puzzles with the final aim of killing said MindMaster. This time the scenario is set in 'HomeBase five' and yet again, humankind is doomed.

The graphics in these three games are, however, very good indeed; the sprites are large, smoothly animated and easy to control. In both *Thunderstrucks* the background scenery is also very well drawn. All are available on tape at £7.95 each.

An old arcade favourite, *Crystal Castles,* is now available for the Beeb from US Gold. I have not seen much of it, but it looks very pretty (although the sprites seem a little on the small side). US Gold say that it is going to be a limited edition – does that mean that they don't think they are going to sell very many? The tape costs £9.99 and the disc £14.99.




***Powerplay*: attractive combination**

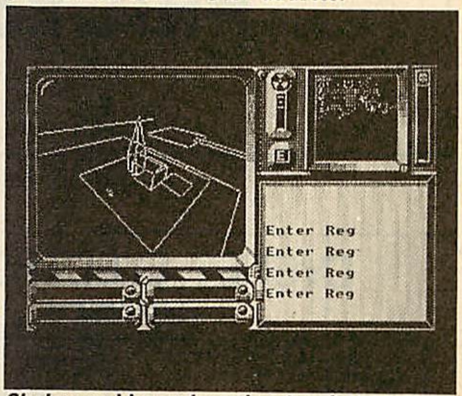
Aardvark have made a comeback with a very good copy of Atari's *Joust.* That's the game where you sit on an ostrich and flap about the screen trying to knock your opponents of their ostriches! This is another very well put together game, with an especially impressive loading screeen. The game is on tape only and costs £9.

One game that seems to have been forgotten is *Powerplay* from Arcana Software Design. This is a cross between chess, *Blockbusters* and *Trivial Pursuit.* 2000 questions are provided with the disc and you must attempt to beat your opponents in trivia to trivia combat. The game is very well laid out with a split mode 2 board & mode 1 question area screen.

The Electron version of the highly acclaimed *Graphic Adventure Creator* will have been released by the time you read this, along with a challenge from Incentive to write the best adventure using the *GAC.* The most outstanding submissions will be marketted by them under the heading Medallion Adventure Series.

All the above games as well as *Stryker's Run, Repton 3* and *The Sentinel* will be available before December 25 and are a very good idea for Christmas presents. Also, from what I've seen of it, *Cholo* from Firebird looks very good, although at the time of writting no release date is available. Full reviews will appear very shortly in *Acorn User,* so watch this space!

For all those frustrated *Repton 2* players out there, Robert Miller may have the solution. He has drawn a complete set of the maps for the game; although we don't say that you'll be able to finish it now, at least you can see how well (or badly) you're doing! We are hoping to publish these maps over the next few months, but if anybody would like the complete set, then send a large (13" by 9") stamped addressed envelope to '*Repton 2* Maps' at the normal *Acorn User* address.




***Cholo*: graphics and an adventure format**

As previously mentioned, the Games Page hopes to carry readers letters and any hints and tips of games. So if any of you have found any pokes giving you infinite lives or whatever, please send them to 'The Games Page' *Acorn User.* Please, please, please, however, make sure that the pokes work with the original copy of the game!

If you are stuck with an adventure, send in the problem and we'll see if any readers can help you out. Similarly if anybody has any hints to any of the harder (ie, Level 9) adventures send them in and we can build up a good adventure help section.

The old high scores table will also appear on this page, so keep sending in yours, but don't forget that all scores must be witnessed by two other people, at least one of whom must be over 18, and also say whether you notched up your millions of points on a BBC, Master or Electron.

I would also be very interested to hear what you think of the Games Page, and if you have any other ideas for possible inclusions in later issues.

# GAMES

## NO REVELS FOR REBELS




**'Rebel Planet'; US Gold; Electron and BBC micro; cassette only; £9.95**

This is a program which promises much, yet achieves very little. A US Gold adventure based on one of Penguin Books' Fighting Fantasy Gamebooks sounds worth a second look. It's a text-only adventure, having a screen layout similar to the excellent Scott Adams Marvel Comics series from Adventure International, with a few lines' description of the current location always at the top of the screen, and scrolling commands and responses below. Plenty of facilities are offered – save a game, use abbreviations, send for a hint sheet. Yet rarely have I played a game with less enthusiasm.

Perhaps it was the hackneyed theme: 'The leaders of the secret Earth organisation SAROS gather their slender resources. . . .only YOU stand in the way of the Arcadians' complete domination of the galaxy!' Yawn.

Perhaps it had something to do with US Gold not answering my letter or sending me the help sheet.

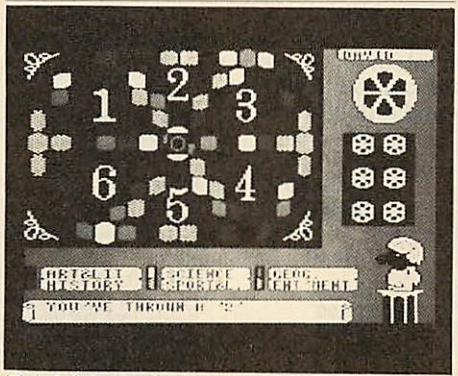
Perhaps it was because, despite a healthy 400 word receptive vocabulary, and a willingness to accept fairly complex commands, such as 'Drop the laser and the tickets, then go down', the program's responses are so limited. Take the message 'You can now disembark', to which I replied, very reasonably in my view, 'Disembark'. The response? 'That's silly'. And when asked to read the coded message 'urwi g ndmi', I felt the response 'I see nothing unusual' a little unprofessional, to say the least.

The game begins with you setting out on what is described as a 'daring and foolhardy mission' to discover and destroy the queen computer of the Arcadians – the one which controls and organises the minds of the Arcadian troops. Disguised as a merchant, you travel to the planets Tropos, Halmurus and Arcadion, looking for clues which will eventually help you discover the right combination to enter the building housing the queen computer. You must keep one eye on the clock all the while, in case your space ship Caydia takes off without you.

Most of the time I got arrested on landing and left to rot in a damp cell. Perhaps that's why I didn't like it!

**Bernard Emblem**

## SIGNIFICANTLY TRIVIAL



**Trivial Pursuit; Domark; BBC micro B+ and Master; cassette; £14.95; disc £19.95**

I knew us harmless Beeb owners couldn't escape for long. What have we done to deserve it? Yes, *Trivial Pursuit* is here! Forget cards and fiddly pieces of plastic: this is a natural computer game with benefits the board version can't give.

Domark won the contract from Horn Abbot (manufacturers of the wildly successful board game) for producing the computer version and, on the whole, have done very well. The game comes on two tapes, one with the program and the other, about a C90, contains the 3000 Genus starter questions.

Once the game is loaded and the number of players selected, the board is displayed, and here is my first quibble. The board is very cluttered and, as it is colour coded, very difficult to play on a black and white TV (although the squares are highlighted when you move).

Star of the game is a cute little character called 'TP' who keeps track of the score and asks the questions, and also throws the dart which takes the place of rolling the dice. When it is your turn flashing squares indicate where you can move. After selecting one, using a seemingly very complicated selection of cursor keys, you are asked a general knowledge question on a subject depending on the colour of the square. This could be Art, Sport, Entertainment, History, Geography or Science, and Domark promise new question tapes with different categories soon for those with other interests or an insatiable thirst for knowledge.

Once you have selected a subject, you are taken to TP's study where he first loads a question from tape (this is surprisingly quick) and then asks you it, sounding very much like a Clanger (remember them?).

Sometimes you may get asked a musical question, in which case TP goes over to his Hi-Fi system and turns a tape on. Graphical questions are also asked and here a screen is rolled down and a map or diagram displayed. While you think of the answer, TP wanders up and down waiting for you.

When you think you have it, you simply say it out loud and press Space, but of course there isn't some fancy speech recognition here, the other players simply have to decide if your answer is close enough to the one shown. Correct answers give you another turn and you win the game once you have won a 'wedge' from each category and returned to the centre.

Master owners don't bother forking out the fifteen quid, as the game doesn't work on the M128. Come on Domark, what's all that extra memory for – function key definitions?

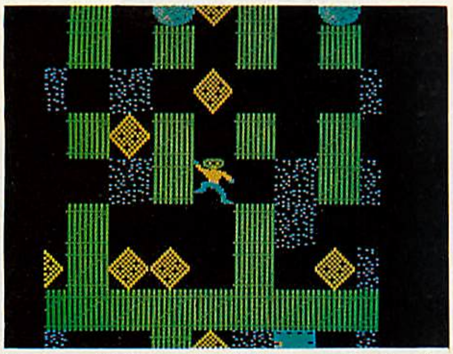
Overall, the game is well presented (apart from the board layout) with some very nice little touches when you are in the study (be sure to watch the clock and the cat!) and makes a welcome, intellectual change from Galaforce.

**David Lawrence**

# REVIEWS

## GAMES

### TAKING A TRIPLE CHANCE



**'Repton 3', Superior Software, BBC micro and Master, £11.95, tape £9.95, Master Compact disc £14.95.**

So they've caught up with 'Jaws' – watch out 'Rocky'. Any game which survives into its third incarnation must go to prove something. But why need it be almost exactly the same as last time?

To be, fair *Repton 3* is very good, the graphics are large and colourful, the tune almost bearable and the scrolling acceptable. The basic idea is exactly the same as its forebears: diamonds still have to be collected, boulder puzzles solved and monsters killed. *Repton 3* has taken the best features from *1* and *2*, added a screen and character designer and as usual offers a £200 prize for the first person to finish it. The most notable improvement over *Repton 2* (but not over *Repton*) is the speed; it is now very playable, and probably better than *Repton* itself as it's so responsive.

Of course, the main facility of *Repton 3* is the screen and character designer. This enables you to redefine totally all the characters and screens used in the game. Screens are designed in sets of eight and three sets are provided. In the game, passwords are given (like *Repton*) when a screen is completed to enable access to the next level.

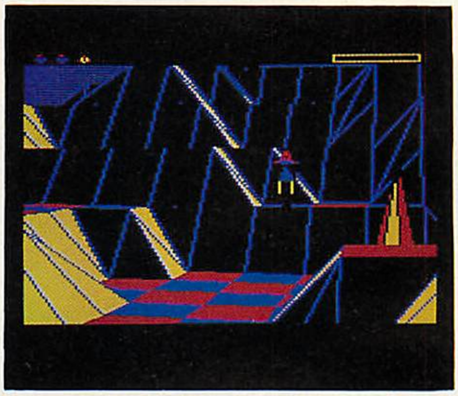
The game itself features some extra nasties. A fungus slowly covers the screen unless you block it in with boulders and a time bomb explodes when you run out of time. The idea of each screen is to defuse this bomb, but all the diamonds and the crown must be collected and all monsters killed before this can be done. Teleporters make a re-appearance from *Repton 2*, but they take you to a different point on the same screen, the screens aren't interlinked.

If you buy the program, you are entitled to buy a '*Repton 3 Fun Pack*' for £1.95, *Repton* for £4.95 and *Repton 2* for £5.95.

Overall the game is very good and the speed is certainly its best point, but is a sequel's sequel going to sell . . .?

**David Lawrence**

### SENSATIONAL SENTINEL



**'The Sentinel', Firebird, BBC models B and B+ and Master, cassette £9.95 and disc £14.95.**

Half an hour with the instructions was enough to convince me that *The Sentinel* is the best BBC micro game ever.

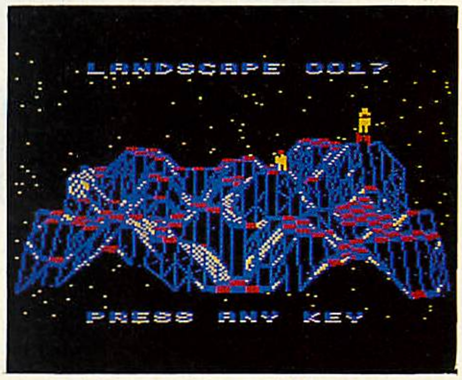
Its author Geoff Crammond wrote *Aviator*, probably the most realistic flight simulator on the BBC micro, followed by the best racing car simulation, *Revs*.

He has produced an entirely new concept – have you heard of any other game where the basic unit of energy is the tree? Or even where three trees are worth a robot? The graphics are amazing. Three dimensional landscapes are generated through fractal routines, and they scroll faultlessly. There's also a very novel way of moving about and 10,000, yes ten thousand, different landscapes!

At the start you are only allowed to play level 0000, but as you improve you get secret codes to get to the others. Each level is made up of a landscape created from various hills, ridges, plateaus and valleys and you are given a 3D perspective view of this landscape from your current position. The idea of each level is to 'absorb' the Sentinel and hence try to defeat his evil influence in the universe.

You absorb him by seeing his base square, ie, the square he is standing on. As he is normally on the highest point in the landscape, this is often not very easy. To gain energy you can absorb the trees that are dotted about the landscape, but, as with the Sentinel, you must be able to see their base square. The only movements you have are to rotate left and right and to pan up and down. To move bodily, you must first create an identical image of yourself in the place to which you wish to move, which costs a robot (the equivalent of three trees), then transport into your new self. At this point you will be facing back towards your old 'shell' which can be absorbed to regain the energy you lost in creating your new self. To gain height, first build a stack of boulders (one boulder equals two trees), create your new self on top of this stack and then transport in the normal way.

During all this, the Sentinel doesn't just sit there like a stuffed lemon waiting to be absorbed. Oh no! He turns slowly on his pedestal trying to find you. As soon as he can see you directly, you are 'scanned' and energy begins to drop. You must either quickly find a place to transport to, or hit the panic button 'H', (hyperspace – it costs one robot) and you will re-appear somewhere random. If you do manage to transport, you must act quickly and absorb




your old shell, as it will still be being scanned. This situation gets worse on later levels where the Sentinel is assisted by sentries, and then there are the trees that turn into meanies . . .

Playing for about three days, I've managed to reach level 0071, but I have a code for level 2044 (send £10 to . . .)

Although the instructions are very complex, I thoroughly recommend this game to anyone – if you see it, buy it, if you don't see it, send off for it!

**David Lawrence**

The 5¼" disc version of Elite now includes:
- The standard Model B, B+ game
- The 6502 Second Processor version
- The Master 128 or Turbo version




BBC Micro Models B, B+

BBC Master Series

**Elite,** the widely acclaimed 3-D space game, is the highest-selling game ever published for the BBC Micro and Acorn Electron. It is now available in enhanced versions specially produced for the 6502 Second Processor and the Master 128 Series.

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SOFTWARE

# HOME ASSEMBLY

**Macro assemblers save machine-code programmers the drudgery of repeated keying of frequently used routines. Harry Sinclair looks at five packages**

```
Enter your command    RUN test
     MACROM (C) PJB, 1985
5012                        ORG &5000
5000                 start
5000   A2 32                LDX #&32
5002                 loop
5002   8A                   TXA
5003   20 E3 FF             JSR OSASCI
5006   E8                   INX
5007   E0 7F                CPX #&7F
5009   D0 F7                BNE loop
500B   20 E0 FF             BNE OSRDCH
500E   20 E7 FF             BNE OSNEWL
5011   60                   RTS
loop   5002              start 5000   U

No errors
24479 bytes remaining
```

**MACROM can provide full assembly listings, this code written to a file called 'test'**

First, some background information for those new to assembler. An assembler (like the one in the Basic ROM chip on the BBC micro and Electron) is a program which takes a single source code statement from your program, such as LDA (load the accumulator), converts it into a single number (opcode) and puts it into a single location. In other words, each assembler statement written by you gets converted into a single machine code instruction.

This is both the strength and weakness of assembler. The machine code programs it produces execute very quickly since they are in the processor's own language and don't have to be interpreted for it. On the other side, assembler source code programs are rather long-winded, difficult to read and for that reason tricky to debug.

The BBC micro's resident assembler is very useful but somewhat rudimentary. Macro assemblers like the ones reviewed here are an attempt to make life easier for the programmer. They remove control of assembly and, usually, source code creation from Basic, and into their environment.

The extent of that removal varies. Some, like *ADE* from System Software, provide a 'cradle to the grave' feeling, where it's very much like using a completely different machine. You have a text editor, an assembler and a debugging monitor to play with. Star Software's *Assembler* does use the Basic interpreter to create source code but without the normal rigmarole of square brackets etc. DDT Software's *MASS* and *ADE* allow you to use wordprocessors like *Wordwise* and *View* to create your source code if you wish. In fact *MASS* lets you use Basic or a wordprocessor. Clares' *MACROM* has a text editor but you can use Basic or a wordprocessor, although it's a bit more messy. Dataview Wordcraft's *ProPak* is very much a text editor with all sorts of fun and games with multi-windows. It also has a very good monitor and – say it soft – a dongle! This irritating little lump of circuitry plugs into the analogue port, depriving you of joystick.

Now here's the catch. I find that text editors are the work of the devil, or at least one of his close relatives. The simplest of tasks requires a great deal of study and button-punching. They appear to be hangovers from the days when CP/M was king and the idea was to make everything seem part of a mystical and difficult process. I particularly dislike the way text disappears off the right of the screen, lurking unseen in some other dimension. Give me *Wordwise* any day. Perhaps that's a bit unfair considering the amount of work that has gone into this software. Actually, *MACROM* is quite good. It tokenises your text so that it takes up the minimum of memory and formats it so you don't have to mess about with tabs or the space bar.

Macro assemblers also have facilities for controlling the progress of assembly, loading in other files at appropriate points, sending outputs to the printer or disc, and error reporting. Some have extensive debugging routines and full blown machine code monitors and text editors. *ProPak* even has the software routines to blow your programs into EPROMs.

Another major facility of assemblers is that memory size is no longer a problem. You don't have to worry about the length of your source code. All of the products here allow you to assemble from and to disc. Your source code can be split into several sections and loaded in and assembled as required with the output (object code) going to one or more files on disc. You can put into your source code as many comments as you like, making it easy to read, understand and debug.

Now we come to macros. In a program of any length, certain groups of instructions will recur many times, with perhaps some slight variations. Particular tasks will need to be performed several times. For instance, one particularly boring, and therefore error prone, task is the saving of registers at the start of a subroutine and restoring them in the correct sequence at the end. Wouldn't it be nice to have one instruction which would do the necessary without all those TYAs and PHAs? Well, with a macro assembler you can. You can type PUSH to save them all and PULL to restore them. At assembly time all of the required instructions will be inserted into your program wherever those statements occur, one statement being converted into

many. The one to one relationship no longer holds good. Of course you would have had to define the macros first.

Another nice thing about macros is that labels used within them are usually local to them – so your macro library can contain many using the same label, and your main program can also use the label. Gone is the boring need to think up new names for loops, etc, and if you do use the same label more than once in your main program, these assemblers will warn you with a multiple definition error. All of the assemblers reviewed here, with the exception of *ProPak*, support not only macros but library facilities as well. You can build up a whole catalogue of macros just once and use them in all your programs, rather like procedures in Basic. Even better, just like procedures, you can pass parameters to the macros so that one macro could appear many times in one program and yet be assembled differently each time. An example of this would be OSBYTE calls (*FX commands in Basic or any other language), all of which require up to three parameters. Having set up a macro called Osb which would look something like:

```
Osb MACRO
    LDA #@1
    LDX #@2
    LDY #@3
    JSR &FFF4
    ENDM
```

you can then write in your source code the instruction:

```
Osb 138,0,65
```

to insert "A" (ASCII code 65) into the keyboard buffer or:

```
Osb 129,0,1
```

to read a key with a 2.5 second wait. In the first case this would be assembled as:

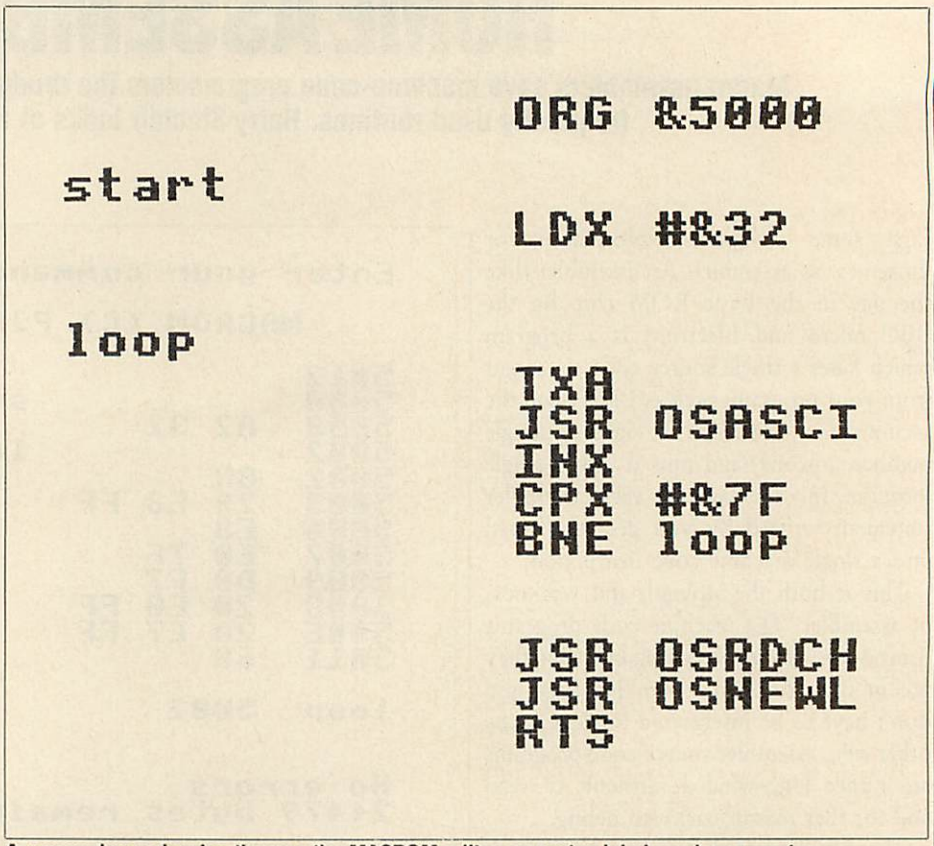
```
LDA#138:LDX#0:LDY#65:JSR&FFF4
```

and in the second as:

```
LDA#129:LDX#0:LDY#1:JSR&FFF4
```

Thus one macro is assembled in two different ways.

Unlike procedures, macros are not subroutines – they are assembled each time they are called, so any task requiring a lot of code and appearing in several parts of your program should be writen as a subroutine to be called when required, otherwise you'll finish up with a very long program. *MACROM* also enables you to define subroutines like macros, to be called from a library file at assembly time. Well, that's the bones of it. Macros may seem complicated but the principle is simple and very useful if you want to write anything more than short routines, and they make source code much more readable. And now the five assemblers.




**A screen dump showing the way the MACROM editor separates labels and mnemonics**

## ProPak

This is the most expensive, but in my view not the best value for money in its present form. It has a very impressive, if a little complex, text editor which allows you to do all sorts of things I don't want to do (but which could be exactly what you require). You may have more than one window on the screen, flip from one section of program to another, or have several sections on screen at once. What I expect from an assembler/software development package are macro libraries. As far as I'm concerned the lack of them renders the whole thing a bit pointless. It's such a pity too. Nice monitor, nice text editor, nice ROM blowing software, lovely manual – but it doesn't do what I want.

It comes on disc but you can blow all the modules onto separate EPROMs, which is just as well since the RAM resident form very much restricts the size of file you can have in the machine at one time. It's a great shame that so much effort seems to have been expended on the monitor and text editor, and not enough on the assembler. The monitor is one of the best I have seen, and is the closest any will get to my ideal. It combines all the best features of Watford's excellent *Beebmon* together with the graphics' capabilities of *Debug*, *Gremlin* and Lincoln's *AID*. Superb.

## ADE

The original and, some say, still the best. At one time this was undoubtedly the best. It has all the facilities I want and a lot more – plenty of assembler directives, macro library, conditional assembly, debugging, monitor and some lovely little touches. For instance, when you are editing an existing file, the original file is automatically transferred to the 'B' directory before you save the new version, so you always have a backup. It really is like using another machine altogether.

Perhaps it is beginning to show its age a little though. One irratating feature is that library macros to be used have to be specified individually before they can be used (fair enough) but they have to be

listed in the order in which they appear in the library file. If you tell the system you want the fifth macro in the library, then the fourth, this latter one will not be found since the library is searched sequentially. I don't expect to have to memorise libraries.

Still, an excellent product despite the CP/M type text editor. The full version comes with text editor, assembler, and a cut-down form of the *SPY* debugging monitor. In addition you get a demo disc containing a library of macros, library manager, and some utilities.

## MASS

A 'no frills' assembler which has been around for some time, but is none the worse for that. No text editor is supplied and macros cannot be used with the tape filing system, and no monitor is provided. But it is possibly the most comprehensive assembler in the review. Source code files can be generated using *View*, *Wordwise* or Basic. There are plenty of assembler directives, conditional assembly, assembly to disc and macro libraries. Files and macros can be nested in one file or can call another for assembly, to a total depth of five.

What more could you want? A very impressive piece of work which comes with a demo disc containing a macro library and utilities, all in three forms suitable for *View*, *Wordwise* and Basic.

Excellent value.

## 6502 Macro Assembler

Star Software's assembler is one of the new breed. Simplicity is the keyword; no monitor or text editor is supplied, you create your programs using the Basic interpreter (with all the limitations of Basic's screen editor), and then call the assembler. All of the features you would expect (except perhaps a debugging monitor) are provided although the implementation of macro and subroutine libraries is not as neat as it could have been, requiring a bit more work from the programmer. It works well though. There are fewer assembler directives than you would expect and it doesn't have the gloss of some of the others – very much a utility model. I think the major drawback of this assembler is the fact that it doesn't allow you to use a word-processor for your source code; Basic's editor really isn't good enough. The manual is also well written. Overall, not bad.

| | Macros | Conditional assembly | Macro libraries | Text editor | Monitor | Ass'y to & from disc | Manual rating (5=best) |
|---|---|---|---|---|---|---|---|
| ADE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 5 |
| MACROM | ✓ | ✓ | ✓ | ✓ | × | ✓ | 1 |
| MASS | ✓ | ✓ | ✓ | × | × | ✓ | 3 |
| ProPak | × | ✓ | × | ✓ | ✓ | ✓ | 4 |
| Star | ✓ | ✓ | ✓ | × | × | ✓ | 3 |

**What you get with each assemblers. Remember the importance of manuals**

## MACROM

This is one of the best. I've already said that I don't really like any of the text editors in this review but at least this one keeps it fairly simple. If you don't own *Wordwise* or *View* it will take a lot of the drag out of writing source code. You just separate label, opcode and operand with a space and the editor does the rest, formatting it nicely into neat columns to produce the type of pretty listing that only other people seem to achieve. No more sand kicked in my face! It also tokenises the text so that it takes up less memory and filing space. You can if you want use a word-processor and spool it to file, *EXECing it into *MACROM* where needed. It also contains a routine to translate source code produced by Basic into its own format. Macro and subroutine libraries are fully implemented and easy to use. If you chain a macro library, *MACROM* will examine it on the first pass and create an index of all the macros and subroutines it contains. On the second pass any mention of a macro will cause it to be loaded from the library and be assembled.

Altogether an excellent product and probably my favourite, although the manual is one of that appalling breed with no index or even list of contents. Do something about it quickly, Clares. Why spoil something good with an insult like this? It could do with some rewriting too.

## Choosing

Well, they are all good products, and any choice will depend on the user's needs. I think I would choose *MACROM*, but I wouldn't be unhappy owning any of the others either. If *ProPak*'s assembler were rewritten to include macros and library facilities I'd find it very tempting despite its price. If they get rid of the dongle and reduced the price to a sensible level – say that of *ADE*, I'd find it irresistable. I haven't dealt with every aspect of these assemblers. Each has its own commands and directives and is a language in its own right. Don't expect to be familiar in hours.

One final word of warning. If you don't do a lot of programming in assembler, keep your money in your back pocket and use the resident assembler. But if you want to enjoy assembler programming, and expect to do a lot of it, do it right and go and buy one of these.

## Jargon

**Dongle**: a piece of circuitry which must be plugged into a specified point in the hardware (such as the user port or between computer and printer). It may be for various purposes, but here is an anti-piracy device. Without it the program (or a pirated copy) will fail, and you can only buy the dongle with the original program.
**Text editor**: any progam for the manipulation of text, figures or lines of code on screen. Wordprocessors are a specific example of text editors.
**Monitor**: not in this case the visual display unit, but a facility of assemblers to allow the programmer to view the code and envisage its effects without running the whole program.

*MACROM, £40 on chip and £35 on disc from Clares Micro Supplies, 98 Middlewich Road, Northwich, Cheshire CW9 7DA.*

*ADE comes on ROM chip with a 40 or 80 track disc (specify when ordering) for £20 plus VAT plus £1.25 p&p from System, 12 Collegiate Crescent, Sheffield S10 2BA. A 'greatly improved' version, ADE Plus, has now been introduced for £46.*

*ProPak costs £65.95 excluding VAT but including post and packing. Contact Dataview Wordcraft, Norman House, Heritage Gate, Derby DE1 1NU.*

*For Star's Assembler contact Star Software, PO Box 5, Wigan, Lancs WN5 7QB.*

*For MASS contact DDT Software, 11 Liverpool Gardens, Worthing, West Sussex BN11 1RY.*

## MULTIPROM EPROM PROGRAMMER




MULTIPROM allows the experienced user to program 2764, 27128, 27256, 27512, 27513 and 27011 EPROMs, including "A" version. Programming of 27256 up types is carried out in 16K blocks to ensure MULTIPROM compatability with all models of BBC from B to Master. The UVP 1.1 software requires DFS and a disc drive for operation.

The fully cased MULTIPROM plugs into the user port on the BBC microcomputer, taking power directly from the computer, with an onboard converter providing the programming voltage. Two switches with LEDs are provided, one powering down the MULTIPROM to insert or remove an EPROM from the Textool ZIF socket, and one for Vpp on/off. DIP switches enable swift configuration of the MULTIPROM for each type of EPROM.

The necessary UVP 1.1 software, which includes fast intelligent programming algorithm, is available on Sideways ROM and contains the following commands:– *TEST (blank check), *READ (afsp), (read EPROM to disc), *BLOW (afsp) (blow EPROM with names file), *VIEW (look at contents of memory from &2000), *COMP (afsp) (compare contents of EPROM to disc). When using *VIEW & *COMP, data is displayed in hex and ASCII format.

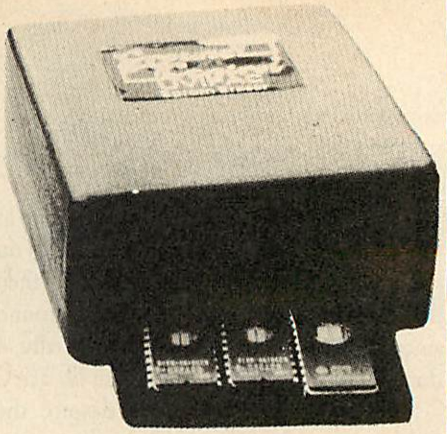
Prices: **MULTIPROM £44.95** **UVP 1.1 ROM £5.00**

## UVIPAC EPROM ERASER

The UVIPAC was designed especially for the home microcomputer enthusiast, but is equally useful in the development lab when quick erasure of just a couple of EPROMs is required.

A special type of discharge tube is used to help achieve the very compact dimensions of the unit, which is housed in a 90 x 80 x 40 mm plastic case. The 230 or 110 volt (+ or -5%) mains powered unit enables up to 3 EPROMs of any size, or 1 CPU with on-board EPROM to be erased in around 15 minutes usually.

The EPROMs are simply loaded into the conductive foam pad supplied and inserted into the unit. After the door has been closed the unit is switched on, an optical fibre indicator showing positively that the unit is in operation. When the required period has elapsed the unit is switched off and the EPROMs removed. The UVIPAC can also be supplied with a built in fixed 15 minute timer, the UVIPAC (T), or with timer and audible time out sounder, the UVIPAC (TS). Spare tubes and conductive foam pads are available if required.



Prices:

| UVIPAC | UVIPAC (T) | UVIPAC (TS) |
|---|---|---|
| £21.45 | £26.45 | £28.45 |

UVIPROM 1 and UVIPROM 2 (with ZIF socket) plugs into the user port and can program 2764 or 27128 EPROMs only, using the 1.1 ROM for control purposes, giving 5 *COMMANDS. UVIPROM 32 and UVIPROM 32+ (with ZIF socket) program 27256 EPROMs only, using the 2.1 ROM, with 7 *COMMANDS. Note that the PCBs are not cased and that a disc drive is essential to use the software.

Prices:–

| UVIPROM 1 & 32 | UVIPROM 2 & 32+ | 1.1 ROM | 2.1 ROM |
|---|---|---|---|
| £20.95 | £25.95 | £5.00 | £8.00 |

| EPROMS Type | 1–2 | 3–9 | 10+ |
|---|---|---|---|
| 2764–25 | £2.30 | £2.20 | £2.10 |
| 27128–25 | £3.00 | £2.90 | £2.60 |
| 27256–25 | £5.00 | £4.90 | £4.80 |

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# Slick!

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SOFTWARE

# SLICK STATISTICS

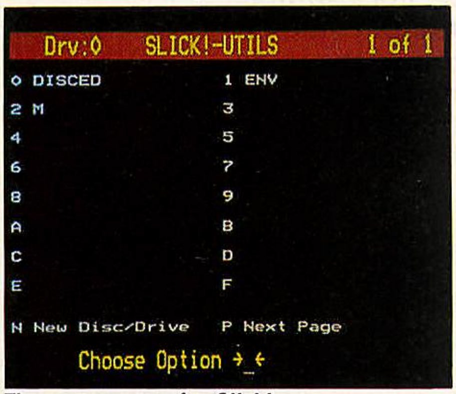
**Powerful utilities from Slick! and comprehensive statistics from Instat**

Perhaps more than any other computer, the BBC micro has attracted software packages on ROM chips. It has become the norm to release new utilities on a chip, because of the ease of calling a command with a 'star'. There are, however, limitations to this approach, particularly the 16k size restriction of a ROM, and the extra cost of the chip.

## Slick!

*Slick!* is provided on disc, which is just as well, as it provides over 50k of utilities aimed at the Basic programmer and disc user. Many of these are themselves written in Basic, but can still be called from disc by typing a star command – more of this later.

The routines are divided into four categories, covering Basic, disc and general utilities, and functions to allow indexed




**The menu screen for *Slick!***

sequential filing within Basic programs. The Basic routines include *ADDPROG to merge two programs, *BAD to rescue a corrupted program, *LINEDEL to delete null lines from programs, *VFIND to search for variables and *VARS to list the contents of all current ones. The two most interesting utilities are *ENV and *STAR.

*ENV is an envelope definer, which allows you to alter any of the parameters within an envelope statement, while displaying the pitch and amplitude envelopes continuously on screen. You can hear the defined sound at any time. The sound statement is fixed whilst using the editor, even though its duration parameter has an effect on the overall sound.

*STAR is used to prepare your own utilities to be called from disc by name. They can be made to handle parameters as well, so you could prepare your new merge routine (written in Basic) to respond to the following command:

*MERGE <filespec 1><filespec 2>

The disc utilities include *DCOPY, *DISCED and *M. The disc copier, *DCOPY, allows you to pre-select the files you want to copy, and to copy them in one go from one side of a single drive to the other.

The disc editor, *DISCED, uses mode 3 and displays a sector at a time. You can move freely around the screen and edit in ASCII or hex. *M calls in a 'menuiser' (horrible word) which will create a menu of all the files on a disc and automatically load any Basic or machine code file. It won't load ROM images into sideways RAM, but the program is again in Basic, so shouldn't be too difficult to patch.

The general utilities include a file compare routine, cyclic redundancy checker (useful for checking *Acorn User* listings), a very fast utility for searching memory, and a printer set up routine. There seem to be a few make-weights in this section: *BIN is a decimal to binary convertor, *FKEY lists the contents of the function keys and *BELL alters the BBC micro's beep.

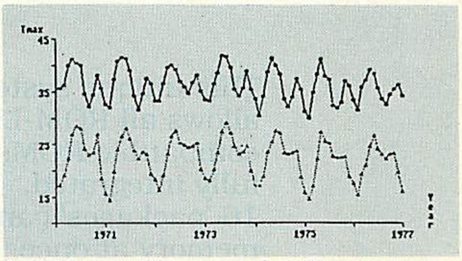
The last set of routines is perhaps the most valuable. They form the core of a complete sequential filing system in Basic. You can attach the code to the end of your database program, and leave it to handle the disc accesses. You will have to get into the workings of the functions to splice them into your own program, but they should still save a lot of development time. BJ Computing are interested in hearing from you if you want to sell your finished creation, but you can use the routines freely for yourself. Overall, *Slick!* represents excellent value for money, and is not very much less convenient to use than an equivalent ROM. Most of the routines in this package call the lie to the adage that the only good utility is a machine-code utility. **Simon Williams**

*Slick! is compatible with the BBC micro and Masters. It costs £9.95 from BJ Computing, PO Box 4, Sheffield S1 1DU.*

## Instat

This is a very powerful and effective statistical package which does everything that is offered by *Unistat,* which was the most powerful of the previous group tested (*Acorn User*, April 1986), and much more as well.

The package is intended for practical use and also as a teaching aid, but it is as the first that it should be judged. It covers every statistical technique that is likely to be used by any undergraduate other than students reading statistics or actuarial




***Instat* has a wide range of plotting methods**

mathematics as a main subject at college.

The package consists of a 16k EPROM chip, a double sided 80 track disc with 185k of utilities (although other formats are available), an A5 sized Introductory Guide and a reference section running to about 200 pages, all in a convenient box. It makes a formidable collection but one that it is hard to fault, given its nature.

The use of the EPROM greatly increases the memory available for computation, which can be a problem with some of the competing systems, and as the data is automatically saved to disc at regular intervals the dangers of loss or corruption are reduced; use of a second processor is permitted, as are most popular DFSs. The flexibility of the presentation of scatter-charts is remarkable.

The price of this package is high but generous educational or quantity discounts are available, and where extensive use is made of statistics and a BBC micro can be devoted to the purpose, *Instat,* is quite simply the best. **Roger Carus**

*Instat, Statistical Services Centre, compatible with BBC B, £97.75. Available from SSC, University of Reading, Whiteknights, Reading RG6 2AN.*

# The only truly integrated suite of ROMs

This unique system allows all ROM-LINK compatible ROMs to be fully integrated. Up to 16 'packages' can be held in memory at once, so for example you could have a spreadsheet and a chart and a document in the word processor all being worked on at the same time. The

ROM-LINK

ROM-LINK system also allows any data to be transferred directly from any package to anyother. For example spreadsheet data could be imported into the word processor, and then back again into the spread-sheet, then into INTER-CHART to plot a graph.




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HARDWARE

# SIDE LONG GLANCE

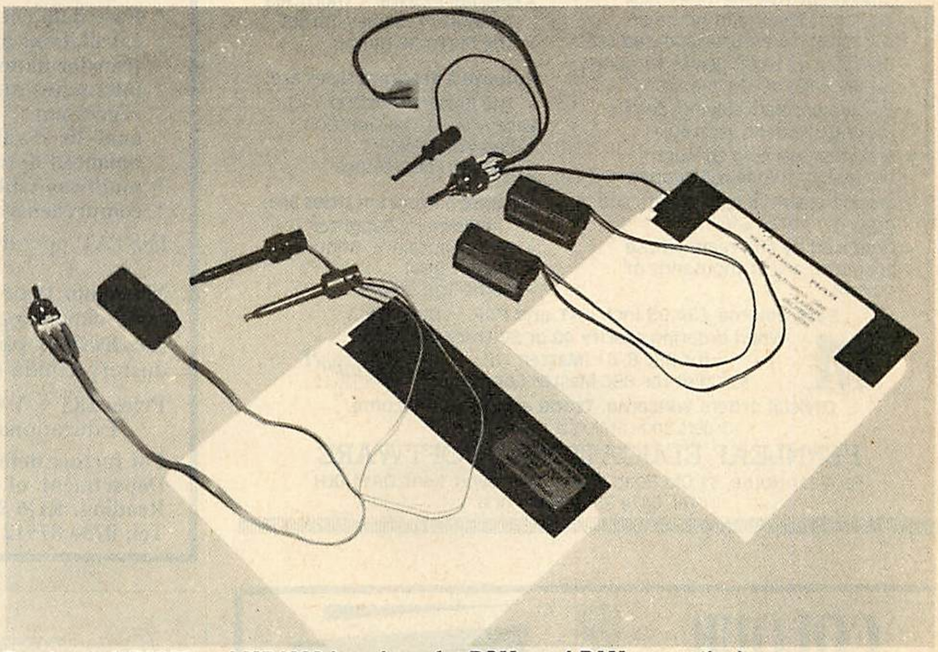
**Chris Drage takes a second look at ways of expanding your micro's memory: ROM boards for more chips and sideways RAM for ROM images and programs**

RAM and ROM boards offer the potential to expand the software capacity of the BBC micro, and a number of them are now available for under £30. From Peartree Computers comes the MR3000 sideways ROM board and the MR4200 32k RAM unit. Three RAM modules have been released from Terrell Electronics, Cygnet Electronics and IFEL. At under £27, each of these provides Beeb owners with the most cost effective sideways RAM yet.

ROM boards add extra sockets for software held on ROM or EPROM chips, such as wordprocessors, or art packages. The standard BBC micro has four such sockets, but one is taken up by the Basic to start with. By the time you add a disc filing system (DFS) and a *View* or *Wordwise* wordprocessor, there's only one left. So if you want to use *Pagemaker*, which comes as two chips, a ROM board is a must.

RAM boards give you extra memory banks, but don't actually increase the space available in which to run your programs. Instead they allow programs to sit 'alongside' the main memory (hence the term 'sideways RAM'), so that they can be called up on demand. Programs put in sideways RAM are treated by the BBC micro as if they were actually in a ROM chip and so are said to be a 'ROM image'. For example, *View* comes as a chip for the BBC and Master micros, but on disc as a ROM image to load into the built-in sideways RAM on the Compact. Also, AMX's *Pagemaker* is available on disc for the sideways RAM in the Master.

So, to sum up the theory, ROM boards give you extra holes to put chips in, while RAM boards enable you to load in software which pretends to be in a ROM chip.



Peartree's MR3000 and MR4200 boards — for ROMs and RAM respectively

| RAM board/: module | Peartree MR4200 | Terrell 16k Module | Cygnet Ramwise | IFEL 16k Module |
|---|---|---|---|---|
| Design: | 4 | 4 | 4 | 4 |
| Construction: | 4 | 3 | 4 | 3 |
| Ease of installation: | 3 | 5 | 5 | 5 |
| Versatility: | 4 | 4 | 4 | 5 |
| Software provided: | 3 | 4 | 3 | 5 |
| Documentation: | 3 | 3 | 3 | 5 |
| Value for money: | 5 | 5 | 3 | 4 |
| **Total:** | **26** | **28** | **26** | **31** |

*KEY: 5 Excellent, 4 Good, 3 Satisfactory, 2 Poor, 1 Very Bad*

A comparison of the RAM boards reviewed in this article. The IFEL product comes top

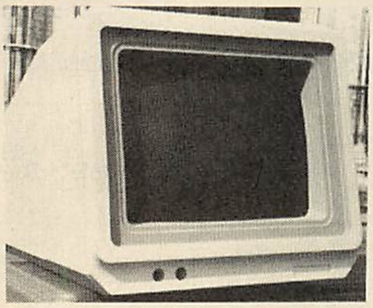
## Peartree MR3000

A direct descendent of the popular MR2000, this ROM board is substantially improved. Its 130mm by 95mm dimensions and its capacity to carry four ROMs certainly put it in the 'mini' bracket. The main advantage of this board over its predecessor lies in its staggered design. This allows access to the four ROM sockets on the main board giving a total of eight ROMs. Unfortunately, it also results in instability when inserting ROMs. A pad to stabilise the board should perhaps have been included. Generally speaking, the MR3000 is a well constructed and neat unit.

Installation requires the OS1.2 chip to be removed and fitted to the ROM board and four flying leads to be connected.

Here the inexperienced electronics hand is at a disadvantage, as one lead must be soldered to link D5 on the BBC micro's main board. This is easily achieved however. The three other leads plug onto links S–20, 21 and 22. Switch on and all is well.

The only point of real criticism lies in the flimsy legs of the header plug, which requires a good deal of care when inserting the MR3000 into IC51 (the socket which houses the machine operating system). Soldering can be avoided by spending another £1 for a plug-in model which offers a probe chip instead. The instructions and diagrams, on two A4 sheets, are reasonably adequate to guide you.



## RAM boards

Since Acorn gave the concept of sideways RAM its blessing with its inclusion in the B+ and Master computers, it has become almost unfashionable not have some sideways RAM lurking in the BBC micro.

## Peartree MR4200

This board offers 32k of sideways RAM on a single unit. In all repects it appears identical to the MR3000 with the exceptions that four 6264 CMOS RAM chips occupy the four sockets and a write line is added. Peartree inform me, that the two boards are different and users should not try to install RAM chips on an MR3000. The option to solder or not is also offered on the MR4200. The only additional installation procedure is to fasten the probe clip of the write line to IC77. A disc of software offers utilities to test, load, save, verify and clear RAM banks. A memory editor is also included as a bonus. This all works correctly but the documentation is a little sparse and could have included details in how to use the editor. Given the criticisms above, the MR4200 is a very effective means of upgrading.

During the year a number of inexpensive 16k sideways RAM modules have appeared which reduce still further the cost of adding RAM to your micro. Essentially, these modules are much alike; comprising a pair of low-power, 8k CMOS (static), RAM chips, diodes, a resistor and a write line. With the exception of the Terrell module, each is encased in a hard, protective, case, the 'footprint' of each unit is no larger than a ROM chip and like ROMs, each module occupies a single ROM socket. Each module measures about 35mm by 18mm by 14mm. The write line is necessary as the micro's ROM sockets were never intended for write operations.

## Terrell RAM module

This unit differs by being packaged in insulation tape and not encased. The review model comprised a linked pair of 16k modules providing 32k of sideways RAM. I installed this unit in a computer fitted with the popular ATPL Sidewise ROM board. Installation requires a write-protect switch to be fitted to the rear of the computer (the reset hole). With the ATPL version, two leads must be soldered to link S-6 (sidewise) though this is not necessary with the standard fitting. The modules can occupy two of the BBC's ROM sockets. A total of 48k of sideways RAM is possible when two 6264 RAMs are added to the Sidewise. All this is managed rather well by the Terrell software, and RAM may be loaded, saved, viewed and protected.

## Cygnet Electronics Ramwise

Ramwise is very similar to the Terrell model in many respects, but there are two probe clips to connect. Also unlike the Terrell module, the write-protect switch is not fitted with an additional lead for ATPL Sidewise users, who must therefore solder their own switch to link S-6.

However, the module is more rugged than the Terrell version. The software and instructions are fairly basic: the former offers just load and save, the latter, a simple A4 sheet. Ramwise is a basic unit which may appeal to network users.

## IFEL module

The major difference between this module and the other two is the lack of a write-protect switch. Directions are given as to fitting a switch but this omission is disappointing and spoils an otherwise excellent system.

In addition to the standard operations, the software offers two excellent facilities: a ROM filing system (RFS) formatter and an enhanced assembler. The former utility transfers Basic programs to sideways RAM format, the latter enables code to be assembled directly into sideways RAM. To assemble directly to &8000 you will require at least two 16k modules, the second one being to hold extra code necessary for the enhanced assembler.

The comprehensive, 20 page manual is a model of clarity. It covers almost all you need to know about the subject.

## Conclusions

Obviously the final choice is personal one. If you want to develop your own sideways firmware, or take advantage of the BBC micro's RFS then the IFEL module is the only choice. Its lack of a write-protect switch is an annoying oversight though.

The Terrell module offers versatility and is the cheapest. It can be recommended for most sideways RAM use.

I have been able to establish that these modules each work with the ATPL and Watford MKII ROM boards but not the Midwich. Each should work in network stations without modification.

*Suppliers: MR4200 and MR300; Peartree Computers, St George's House, 14 George Street, Huntingdon, Cambs PE18 6BD. Terrell Module; Terrell Electronics, 78 Essex Gardens, Hornchurch, Essex RM11 3EH. Ramwise; Cygnet Electronics, PO Box 27, Bordon, Hants GU35 0HH. IFEL Module; IFEL Electronics, 36 Upland Drive, Plymouth, Devon PL6 6BD.*

| Board/ module | RAM option | RAM positions(s) | RAM write protect | Installation | Cost | Software provided |
|---|---|---|---|---|---|---|
| MR4200 | 32k | 15/14 | No | 1. Plug in – solder one lead | £31.50 | 6 utilities |
| | | | | 2.Plug in | £32.50 | |
| Terrell Module | 16k | Any | Yes | Plug in | £22.00 | 3 utilities |
| | 32k | | | | £35.00 | |
| Ramwise | 16k | Any | Yes | Plug in | £21.50 | 3 utilities |
| IFEL Module | 16k | Any | No | Plug in | £26.85 | 6 utilities |
| **Board** | **RAM or ROM** | **Total ROMS available** | **RAM available** | **ROM board installations** | **Cost** | **Software provided** |
| MR3000 | ROM | 8 | None | Solder | £13.00 | N/A |
| | | | | (Plug in only) | £14.00 | |

**The Table above provides a quick comparison, showing you what you get for each of the models**

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| 747 | BBC B only | cass | 8.95 |
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| | | | |
|---|---|---|---|
| **Fujitsu 2764-25** | 1-2 pcs **£2.65**, | 3-9 pcs **£2.40**, | 10+ pcs **£2.30** |
| **Fujitsu 27128-25** | 1-2 pcs **£3.55**, | 3-9 pcs **£2.90**, | 10+ pcs **£2.70** |
| **Fujitsu 27256-25** | 1-2 pcs **£4.75**, | 3-9 pcs **£4.50**, | 10+ pcs **£4.30** |
| **Hitachi 27256-25** | 1-2 pcs **£5.25**, | 3-9 pcs **£5.00**, | 10+ pcs **£4.75** |
| **Hit. 27C256-20/25** | 1-2 pcs **£6.95**, | 2-9 pcs **£6.70**, | 10+ pcs **£6.50** |
| **Hit. 27512-25** | 1-2 pcs **£14.50**, | 3-9 pcs **£13.95**, | 10+ pcs **£12.95** |

**Intel 27513** 1/2 pcs **£17.50**, 3+ **£16.95**

**NB** Hitachi have stopped supplying 21 volt Vpp EPROMs
Test show that 21 volt Vpp Fujitsus are **equally as good**
**Hit. 6264LP15** (ATPL) Watford **£2.95 2 + pcs £2.65**
**NEC 41254/41464-15** (upgrading Solidisk) **£6.00** each
**Hit. 48416/NEC 41416** (=4416) (upgrading Watford) **£2.50** each
**NEC/Sam 41256-15** 1-2 pcs **£2.95**, 3-9 pcs **£2.60**, 10+ **£2.50**
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**VersEprom** programs 2764, 27128, 27256, 27512/3 EPROMs, including "A" (12.5v Vpp) versions. Commands available are TEST, READ, BLOW, VIEW and COMP. Prices are:-

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## DIAGRAM

Still the only drawing program available for the BBC micro which gives you the ability to draw really large diagrams and scroll them smoothly around the screen stopping to edit them at any time if required.

Pineapple's unique method of storing the diagram information on disc means that the size of diagrams is limited only by the free space on disc, and not the amount of computer memory you have available. (A blank 80 track disc will allow up to 39 mode 0 screens of diagram).

The superb print routines supplied with the program enable large areas of the diagram to be printed in a single print run in a number of different sizes and rotated through 90 deg. if required. Full use can also be made of printers which have a wider than normal carriage available.

The program is fully compatible with the Marconi Tracker ball described below.

PLEASE STATE 40 or 80 TRACK DISC & WHETHER STANDARD BBC or MASTER VERSION IS REQUIRED

**PRICE £25.00 + VAT**

## DIAGRAM UTILITIES

A suite of six utility programs which add additional features to the 'Diagram' drawing program. The utilities include the saving and loading of areas of diagram to and from disc. The ability to display the whole of your large diagram on the screen at one time (in either 4★4 or 8★8 screen format). The addition of borders and screen indents to diagrams, and the ability to shift a whole diagram in any direction.

**PRICE £10.00 + VAT**

## MARCONI TRACKER BALL

This high quality device comes with it's own Icon Artmaster drawing program and utilities to enable it to be used in place of keyboard keys, joysticks, or with your own programs.

**PRICE £60.00 + VAT p&p £1.75**
**PRICE INCLUDING 'DIAGRAM' SOFTWARE £79.00 + VAT p&p £1.75**

## TRACKER BALL for MASTER series

The Pointer ROM is supplied instead of the Icon Artmaster disc and enables the Tracker ball to work directly with the MASTER series computers. (e.g. to use with TIMPAINT etc.). Prices are the same as for the standard tracker ball.

## POINTER

The Pointer Rom is available separately for people already owning tracker balls, and comes with instructions for use with the MASTER computer.

**PRICE £12.50 + VAT**

## PCB

This new release from Pineapple is a printed circuit board draughting aid which is aimed at producing complex double sided PCB's very rapidly using a standard BBC micro and any FX compatible dot-matrix printer.

The program is supplied on EPROM and will run with any 32k BBC micro (including Master series). Also supplied is a disc containing a sample PCB layout to demonstrate the programs features.

By using an EPROM for the program code the maximum amount of RAM is available for storing component location and ASCII identification files etc. (Up to 500 components and 500 ASCII component descriptions may be stored for a given layout). These is no limit to the number of tracks for a given PCB, although the maximum size of board is restricted to 8" * 5.6".

Using a mode 1 screen, tracks on the top side of the board are shown in red, while those on the underside are blue. Each side of the board may be shown individually or superimposed. A component placement screen allows component outlines to be drawn for silk screen purposes and component numbers entered on this screen may be displayed during track routing to aid identification of roundels.

The print routines allow separate printouts of each side of the PCB in a very accurate expanded definition 1:1 or 2:1 scale, enabling direct contact printing to be used on resist covered copper clad board.

This program has too many superb features to describe adequately here, so please write or 'phone for more information and sample prinouts.

**PRICE £85.00 + VAT**

## CONVERTER LEADS

Converter leads to enable the Trackerball to run mouse software and the mouse to run trackerball software (inc. DIAGRAM). Please state which way round when ordering.

**PRICE £8.00 + VAT**

## MICROSPICE

A new addition to our range of engineering software. Microspice is a very powerful DC and AC analogue circuit simulator package for any model BBC computer.

As well as all the usual facilities available with this type of program, non-linear effects. small signal, noise measurements and sweeps may be performed. Component values may be swept, allowing component tolerances to be investigated as well as thermal performance etc. Comprehensive transistor modelling is incorporated using a 20 parameter Ebers Moll description. The program is supplied on disc with a very comprehensive 49 page manual.

Please write or 'phone for more information

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# The MDFS Series
## A New Range of File Servers

### MDFS Specification

- The system can be configured in many different ways, using hard and floppy discs together
- Modular design
- Absolutely standard Econet® system
- Fully compatible with Level 2 and Level 3 file servers and has many advanced features
- Advanced space accounting and access control system
- Built in Real Time Clock
- 256 Kilobytes of internal RAM
- Replaces BBC micro (with disc and net interfaces), second processor, file server software and two printer server ROM's
- Prices for the MDFS System start at £1200 ex VAT

#### Floppy Discs

Can use up to four standard 80-track floppy disc drives to give 3.2 Megabytes of storage.

#### Hard Discs

For larger storage requirements two 20 Megabyte hard disc drives may be attached providing up to 40 Megabytes of storage.

#### Tape Backup

Fast and secure backups for hard disc are provided by an optional 20 Megabyte tape streamer.

#### Printer Facilities

Two independent printer channels are provided. Printers may be configured for spooled or non-spooled printing.

### Products and Services

- SJ Research also manufacture other file servers for Econet®
- Network interfaces for other computers
- A range of accessories for installations
- A full installation service
- Maintenance contracts

### Future Products

- These include Econet® interface cards for the following
- IBM PCs and some compatibles
- RS232 ports
- S.A.S.I./S.C.S.I. bus

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SJ Research Limited,
108 Mill Road,
Cambridge CB1 2BD
Telephone: (0223) 69927

SJ research

If you own a BBC Micro, Commodore 64 or Spectrum 48k/128k – you could have a totally automated home at your command.

It's time your computer grew up and realised its full potential – as something more than a data base, a word-processor or an expensive toy for your kids. From now on, your home computer can do a lot more than play games.

The Red Boxes control system lets your computer earn its keep defending your home against intruders, acting as a round-the-clock security system, giving you control over any electrical appliance whether you are in, or out.

The Red Box starter system takes you right into the exciting world of home automation from as little as £129.




## Just plug in for a more efficient home.

Simple to operate, it plugs straight into your home's ring main and needs no other wiring. You don't need any programming experience to operate it.

The system can control internal and external lighting, on/off switches and dimmers in different rooms in different sequence. It can activate washing machines, tumble driers, dishwashers, hi-fi, television, heaters – in fact, everything operating through your mains via a 13 amp plug.

## Prevent daylight robberies.

Most burglaries happen during the day, so the Red Boxes control system works just as hard then as it does at night.

If an intruder enters your home, the Red Boxes control system will see him off sharply.

As soon as its sensor is disturbed, the alarm will raise the roof.

However, more importantly this system can also deter people entering your home by creating an appearance of constant activity.

## Turn your home computer into a command terminal.

The Red Box starter system comprises three red boxes.

RED LEADER is a complete 6502 based microcomputer with 16 kbytes ROM, 8 kbytes RAM, peripheral controller with 2400 baud mains modem and host computer link, with an integrated power supply. Its powerful micro-processors turn your micro-computer into a command terminal. This is the heart of the system – its even sophisticated enough to recognise which type of computer you own!

RED ONE is a micro-processor controlled 13 amp mains outlet working under the supervision of Red Leader. With Red One at a socket you have power over domestic appliances and lights connected to that outlet.

RED TWO is a complete micro-processor controlled movement detector which feeds back data to Red Leader via mains borne signals – raising the alarm on intruders as soon as they enter its heat seeking zone.

## Unique tamper-proof security.

Our Red Boxes operate a secure communications protocol. Incorporating tamper-proof PIN codes. All 'slaves' – outlets, sensors, switches – are first introduced to Red Leader using their own secret 24 bit address. Secret 'keys' are assigned to every device – lights, TV etc., known ONLY to you, and messages between devices are also encoded using random numbers to further secure the system.

No other Red Leader knows your slave codes; therefore no unauthorised person can interfere with the operation of your system.

## Computer to computer communication.

Communication is a vital aspect of our Red Boxes system. Controllers are not isolated from one another – they are connected with each other, through the mains borne system and so communicate with each other and with Red Leader. If Red Two sends a message to Red Leader indicating an intruder, Red Leader responds by telling a switch unit to activate the alarm.

If you operate two home computers, they can communicate with each other through the system, enabling you to set them more complex tasks. And because Red Boxes have integral micro computers, this leaves your home micro free for normal use outside Red Boxes programming.

## The possibilities are endless.

Our Red Boxes are ready for them. With humidity detectors, sensors or additional motors, this system can be used for weather monitoring, aerial rotation, home brewing, greenhouse thermostat control, keyless access via electronic door locks, remote access control via a telephone modem – even a robotic arm for performing simple mechanical tasks like tea making and shoe polishing. One day we might even invent one to iron shirts, why not.

Our Project Manual at £9.95 describes a whole series of exciting applications.

## Trial run.

For a FREE 14 day trial of the Red Boxes control system WITHOUT OBLIGATION complete the coupon and post to: Electronic Fulfilment Services Ltd., Chesterton Mill, French's Road, Cambridge CB4 3NP.

Access credit card holders can order by calling 0223 323143.

Your Red Boxes control system will be delivered within 14 days and if you are not delighted for any reason just return it to us for a full refund.

The Red Box starter system costs £129.

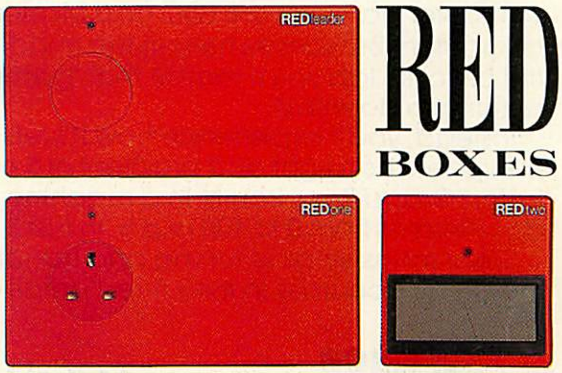
And additional Red One and Red Two Boxes are £34.95 each.

JUST PLUG IN AND SEE WHAT YOUR HOME COMPUTER IS MADE OF.

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Please send me the Red Box starter system at £133 (inc. £4 p.&p.)
My microcomputer is a BBC Micro/Commodore 64/Sinclair Spectrum/Amstrad (Delete as applicable.)
Also include: ______ Project Manuals at £9.95.
______ additional Red One control boxes at £36.95 each. (inc. £2 p.&p.)
______ additional Red Two infra red sensor boxes at £36.95 each. (inc. £2 p.&p.)

I enclose a cheque for a total of £______ made payable to General Information Systems Ltd. Readers' Account.
or charge my Access credit card no. ______
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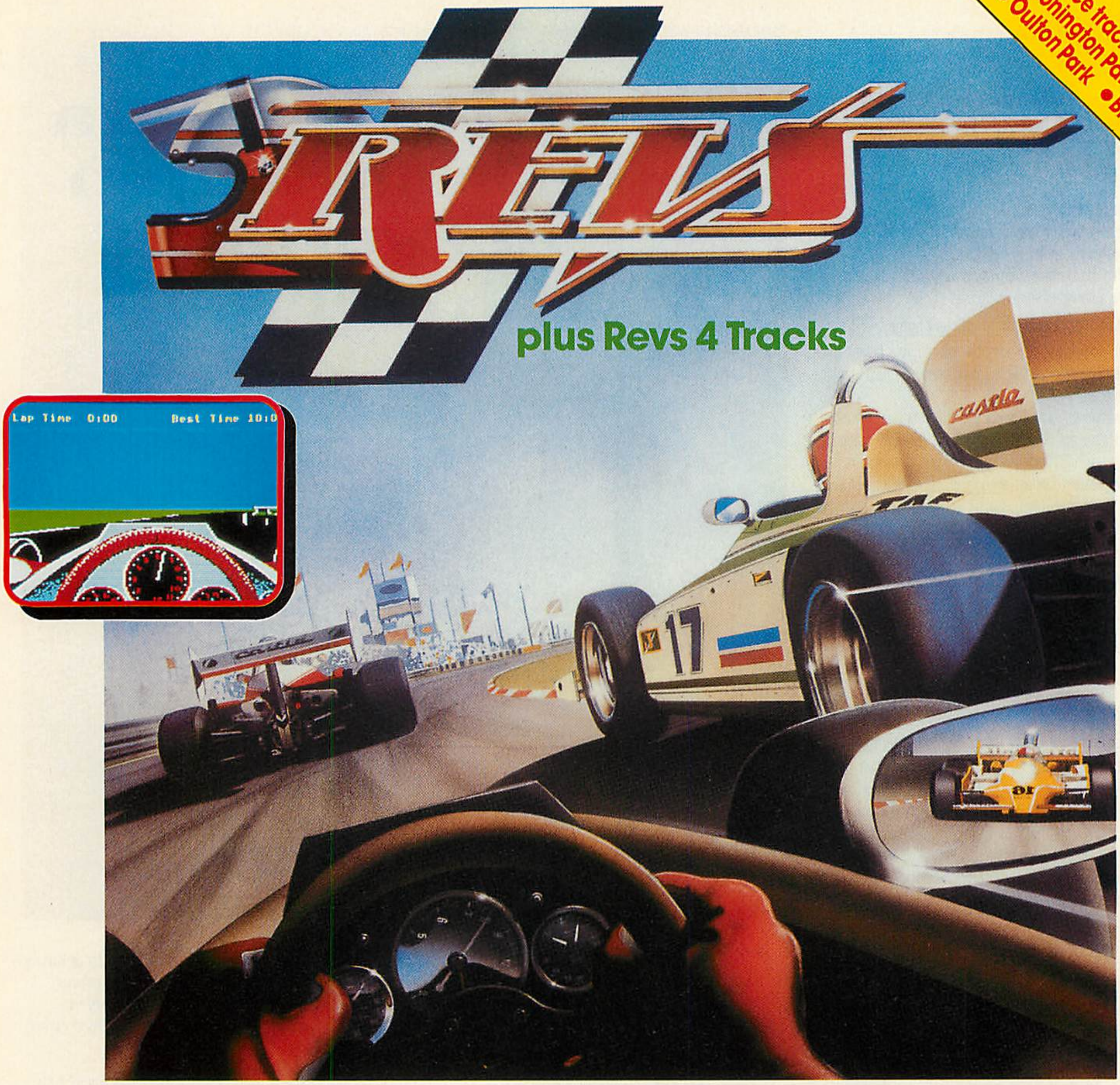
A3




RED BOXES

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Now includes 5 race tracks: • Silverstone • Donington Park • Snetterton • Oulton Park • Brands Hatch







**Revs** (now including **Revs 4 Tracks**) is widely accepted as being far and away the most realistic simulation of motor racing ever devised.

Technically, of course, **Revs+Revs 4 Tracks** is a computer game for the BBC and Master Series computers. But somewhere in the middle of your first practise lap you'll realise that "game" has nothing to do with it.

Instead, you'll experience how it feels to drive every bend, straight and gradient of 5 of the world's fastest Grand Prix circuits. In a machine that accelerates from 0 to 100 m.p.h. in just 3.2 seconds.

Gear ratios, engine tuning and handling — they're all accurate in their finest detail and faithfully programmed in this remarkable simulation.

You can even pre-set the aerodynamic profile of the car to suit your driving style.

So take our advice: before you try for the lap record at Silverstone, Donington Park, Snetterton, Oulton Park or Brands Hatch, study the circuit diagrams carefully.

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**is compatible with the BBC B, B+ and Master Series computers.**

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The package consists of terminal emulation software, a facility for redisplaying frames saved to disc, a printer dump and a booklet simply describing the teletel service. It costs just £19.95 an disc including P&P.

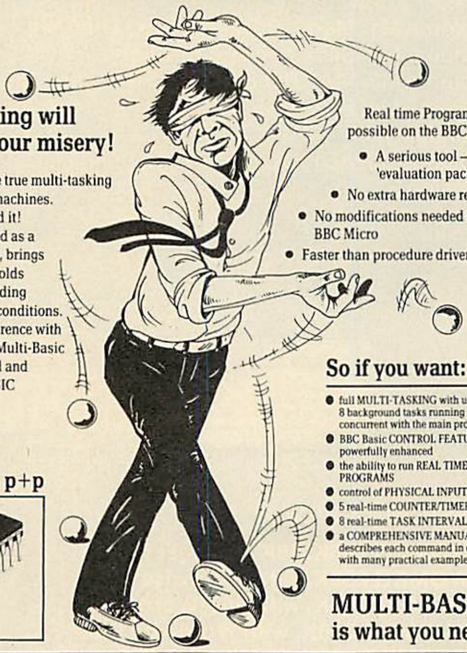
"every school's computer centre should ensure this is available" Network User

**STOP PRESS** Difficulties with phones and modems? We have just released a disc containing some 50 varied and interesting pages from Teletel to give an excellent introduction to the service. Minitel taster costs just £19.95 inc p&p

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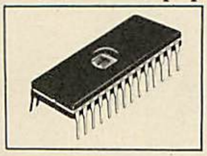
This module, packaged as a ready-to-fit sideways ROM, brings you a robust system that holds its own in the most demanding industrial and laboratory conditions.

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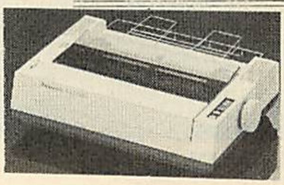
## ROMS/UPGRADES

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| Inter-Word | 38.26 | 44.00 |
| Inter-Sheet | 38.26 | 44.00 |
| Inter-Chart | 25.00 | 28.75 |
| Wordwise Plus | 38.26 | 44.00 |
| View 2.1 | 36.52 | 42.00 |
| View 3.0 | 55.65 | 64.00 |
| ViewStore | 36.52 | 42.00 |
| ViewSpell | 30.39 | 34.95 |
| View Plot (disc) | 22.61 | 26.00 |
| Acorn 1770 DFS | 42.61 | 49.00 |
| Acorn 8271 DFS | 41.74 | 48.00 |
| B Plus 64K to 128K | 26.00 | 29.90 |

## EPROMS, 8271
(Hitachi)

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|---|---|---|
| 1-9 27128 250nS | 2.57 | 2.95 |
| 10 + 27128 250nS | 2.30 | 2.65 |
| 1-9 2764 250nS | 2.26 | 2.60 |
| 10 + 2764 250nS | 2.00 | 2.30 |
| 1-9 27256 250nS | 4.57 | 5.25 |
| 10 + 27256 250nS | 4.13 | 4.75 |
| 1-9 TTI/Cmos set | 4.77 | 5.49 |
| 1-9 8271 controller | 30.43 | 35.00 |
| 10 + 8271 controller | 29.00 | 33.35 |
| 1-9 6264LP 150nS | 2.56 | 2.95 |
| 10 + 6264LP 150nS | 2.30 | 2.65 |

## Panasonic KXP 1080



with BBC cable & paper
**£159.00 (£138.26+VAT)**

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| KXP1080 Control Dump rom | 13.00 | 14.95 |

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## KAGA/TAXAN KP810
with BBC cable & paper
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## JUKI 6100
with BBC cable & paper
**£259.00 (£225.22+VAT)**

## CITIZEN 120D
with BBC cable & paper
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## EPSON LX86
with BBC cable & paper
**£236.00 (£206.00+VAT)**

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| LX Dust Cover | 4.00 | 4.60 |
| LX View Printer Driver | 8.65 | 9.95 |
| Control/Dump Rom | 13.00 | 14.95 |
| KP Dust Cover | 4.00 | 4.60 |
| KP View Printer Driver | 8.65 | 9.95 |
| KP Control/Dump Rom | 13.00 | 14.95 |

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| Epson FX85 | 312.17 | 359.00 |
| Epson FX100 | 425.22 | 489.00 |
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| MP165 | 173.04 | 199.00 |
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| 2.0m (6foot) BBC cable | 7.78 | 8.95 |
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| Cumana CS400 | 137.39 | 158.00 |
| Cumana CD800S | 253.04 | 291.00 |
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| Akhter MD802C | 207.83 | 239.00 |
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| Philips BM7502 | 68.70 | 79.00 |
| Philips BM7522 | 73.91 | 85.00 |
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| Taxan KK1202GP39 | 94.78 | 109.00 |
| Taxan KX1203G | 97.39 | 112.00 |
| Taxan Sup. Vision 2 | 277.39 | 319.00 |
| Taxan Sup. Vision 3 | 319.13 | 367.00 |
| Microvitec 1451MS | 223.48 | 257.00 |

(Prices include BBC Cable)

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| Master 128k Micro | 390.43 | 449.00 |
| Master ET 128k Micro | 338.00 | 388.70 |
| 512 Co-processor | 160.89 | 185.00 |
| Turbo Upgrade | 98.00 | 112.70 |
| Acorn Cartridges | 10.87 | 12.50 |
| Reference Manuals | 14.95 | 14.95 |
| View 3 user guide | 9.50 | 9.50 |
| View Sheet user guide | 9.50 | 9.50 |
| Master & BBC dust covers | 3.00 | 3.45 |
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ADD-ONS FOR MASTER 128K

# ONE MEGABYTE OF RAM ON A CARD

More and more software relies on the MASTER 64K Sideways RAM to run, forcing many of us to leave the two links L18 and L19 in RAM position and use only one ROM socket for our ROM software. Standard software cartridges are convenient but they have only 2 ROM sockets and frequent swapping may be necessary. Lastly, 64K is not enough to make an effective RAM DISC.
Solidisk memory cards can solve all those problems and enhance your MASTER still further. The RAM CARD can add up to 1 Megabyte of RAM, the ROM CARD has 4 high capacity ROM sockets and a switch to control the two links L18 and L19.

## SOLIDISK MEGA-RAM CARD FOR THE MASTER:

Eight 1-Megabit RAM chips hold this Megabyte of memory and the entire system is completely contained on a single card measuring only 85mm × 95mm — half the size of a postcard — yet it has 8 times more RAM than the MASTER.
The control software is in a 16K ROM, also built-in on the card, which will turn this memory instantly into one or two RAM DISCS, or a printer buffer or simply 64 banks of Sideways RAMs which in turn may contain ROM images.
If you feel that One Megabyte may be too much, we have the same card fitted with 256K memory instead. This is still enough to give you in silicon the equivalent of an 80 track disc drive in DFS format (200K bytes) or 16 Sideways RAM banks. At only £100 inclusive of VAT, you pay less than 40p for each kilobyte. And when 1-Megabit RAM comes down in price, you may get it upgraded to One Megabyte later. We foresee Megabyte RAM cards priced as low as £200 towards MARCH 87 — that's less than 20p a kilobyte. So you see, cheap Megabyte MASTERS are just around the corner. The RAM CARD can be a printer buffer, freeing your computer and saving you time. It can be one or two RAM drives replacing physical floppy disc drives. RAM DISC is 10 times faster than physical drives and quiet as they do not have any moving parts. The RAM DISC can be 100K or 200K in DFS format and up to 640K in ADFS, with the one Megabyte card. The maximum RAM disc capacity is 17K less than either 256K or 1024K capacity of the card.
The card may hold ROM images. Up to 16 or 64 images can be held on the card and *LCAT will list them all. Any one of them can run at any time after *SELECT <ROM name>. If Solidisk MDFS 3.0 and/or MADFS 3.0 ROM is installed, you may have both RAM DISC and Sideways ROM images at the same time.
The RAM CARD is simply plugged into any of the two cartridge slots with the label facing you.

**Price:**
**256K RAM CARD (Code R256) and manual ............£100**
**Megabyte RAM CARD (Code R1024) and manual ...POA**

## SOLIDISK ROM CARD AND T-SWITCH:

This simple card features 4 high capacity ROM sockets, accepting both 16K and 32K EPROMs. One socket can be made to accept a 32K byte static RAM chip (type 62256-15). To select a ROM (or RAM if installed), set a combination for the 2 mini DIP switches. A two position switch is also included to control external links L18 and L19 so that you do not have to open the case just to change the link position. The switch is fitted with proper connectors for easy and secure installation.

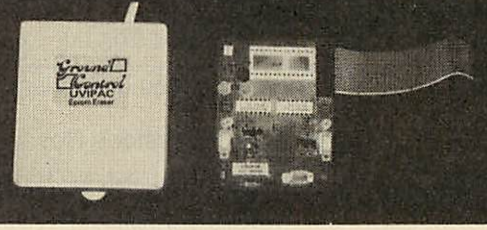
**Price:**
**Basic ROM card with T-switch (code R104) ..........£15.00**
**Same with 32K static RAM fitted (Code R103) ......£27.00**

## EPROM PROGRAMMERS AND ERASERS:

The UVIPROM can program 8K (2764) or 16K (27128) EPROMS from disc files. A software disc (40 track) is supplied and includes a powerful Machine Code Monitor and Disassembler (SOLIMON). A special version — UVIPROM 32-should be ordered to program exclusively 32K (27256) EPROMS.
The MULTIPROM is the DE-LUXE version of the basic design, capable of programming all types including 64K (26512/27513) EPROMS, cased and fitted with Textool Zero-Insertion-Force (ZIF) socket. The UVIPAC is an Eprom ERASER which can erase 3 EPROMS of any type in around 15-20 minutes.

**Prices:**
**UVIPROM (Code U16) Eprom programmer for 8K and 16K ..................£20.00**
**UVIPROM-32 (Code U32) Eprom programmer for 32K ..................£21.00**
**MULTIPROM (Code UM) Eprom programmer for all types ..................£44.50**
**UVIPAC Eprom eraser for all Eproms ..................£20.00**

**Blank Eproms:**
**8K: £1 each, 16K: £3 each, 32K: £6 each, 64K: £12 each.**

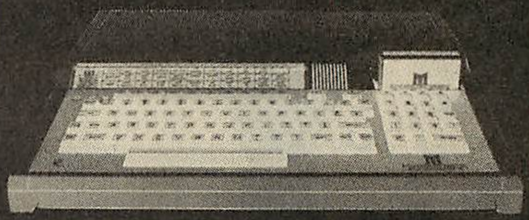



## £3 PER DISC OR £10 BY 5 — SOFTWARE FOR SIDEWAYS RAM:

We have 10 discs full of software for the old Beeb which is now 'Masterised'. You can order any volume (M1 to M10) individually for £4 or by pack of 5 discs (MP1 or MP2) at £10.00 each.

Master Software Pack 1:
Volume M1: Menu, Printer, Index, Solimon, Uviprom.
Volume M2: Silexicon and Silexigen.
Volume M3: MACRO BASIC, Linker and Editor.
Volume M4: SFX (special effects) and Soliwin (a window manager).
Volume M5: ADFS 80 track-D/S, Solidisk Datafile Version 3.

Master Software Pack 2:
Volumes M6 to M10 contain around 50 computer games.

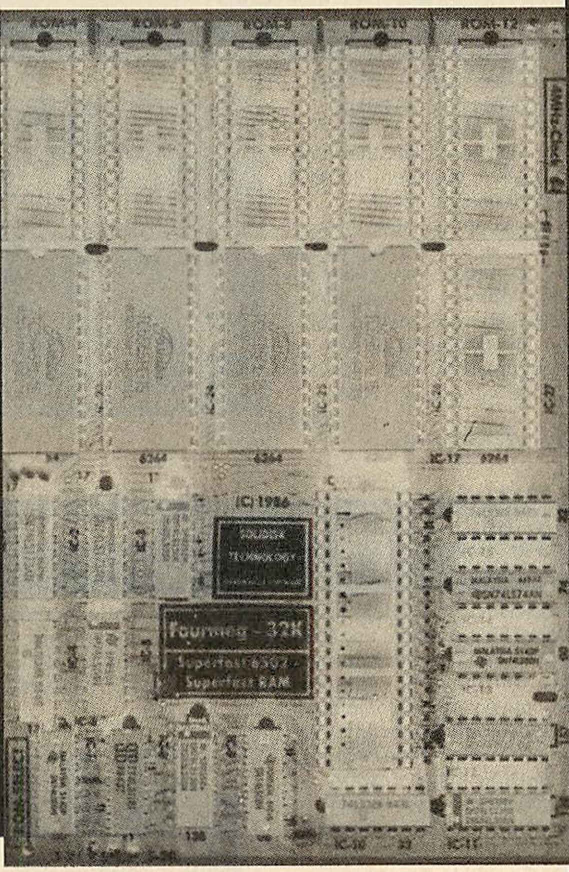


**BEEB 256K PRICES:**
**TWOMEG 256K, 16K Manager ROM ............£115.00**
**TWOMEG 256K, with Wordwise Plus ............£145.00**
**TWOMEG 256K, with InterWord ............£165.00**
**FOURMEG 256K, with Wordwise Plus ............£165.00**
**FOURMEG 256K, with Interword ............£185.00**
**ROM board TRADE-IN discount ............£30.00**

**COMPANY'S HOLIDAY:**
**WE WILL BE CLOSED BETWEEN 25TH DECEMBER TO 2ND JANUARY**

**SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).**

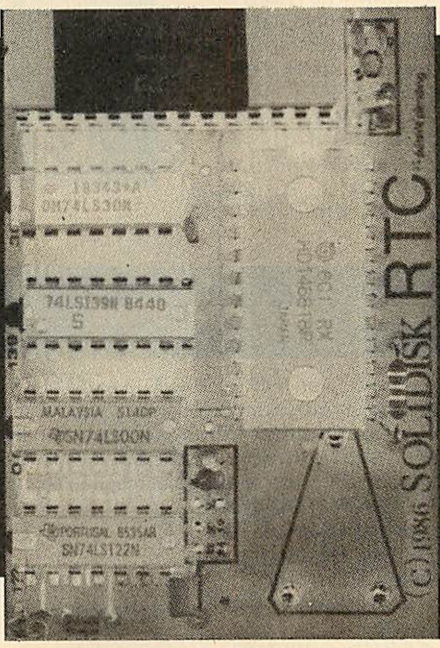
## Shadow, Sideways ROM and Sideways RAM All-In-One for £50:




This board, the TWOMEG-32K, is specifically designed with the SCHOOL BEEB in mind so that one could have everything one wanted on a single, compact and extremely easy to install unit. All the necessary software is in a MANAGER ROM (supplied).
The top row of FIVE ROM sockets will take software ROMs, up to 32K each such as used on the BBC Plus and MASTER 128.
The middle row contains 32K of additional CMOS, low power RAM, acting as SHADOW RAM or as two banks of SIDEWAYS RAM.
The empty 40 pin socket will receive either the normal 2MHz CPU or the optional enhanced, faster 4MHz CMOS 65C02 (the board will be then called the FOURMEG-32K).
The TWOMEG-32K combined the usual functions of a Sideways ROM board — offering storage for up to 160K on board and 64K on the Beeb itself (a total 224K out of 256K possible) and a SHADOW RAM compatible with major 'language ROMs' such as BASIC, VIEW, WORDWISE, INTERWORD, VIEW-SHEET, VIEW-STORE etc.
When Shadow RAM is in use, a small 8K of Sideways RAM is available for loading ROM images or a small printer buffer. When SHADOW RAM is not in use, the entire 32K additional RAM can be used as TWO banks of SIDEWAYS RAM or as a RAM DISC (available only with Solidisk DFS or ADFS).
The MANAGER ROM also contains a powerful TOOLKIT to assist PROGRAMMING IN BASIC.
The attraction of the TWOMEG-32K board comes from its versatility, its convenient software in ROM and its low price tag. Furthermore, the board can be fitted with a CMOS 65C02 capable for example of running the new BASIC 4 (some 30% faster than BASIC 2 and also more accurate) or upgraded to FOURMEG speed, comparable to the TURBO board on the MASTER.

| | |
|---|---|
| TWOMEG-32K | £50.00 |
| 65C02 (2MHz) for the above | £10.00 |
| Or upgrade to FOURMEG | £25.00 |
| FOURMEG-32K | £70.00 |

## Real Time Clock & Desk:




The Real Time Clock and Calendar (RTC) can be plugged into any ROM socket on the BBC Model B with absolutely no other connection to make.
The Real Time Clock is powered by a rechargeable battery which should keep the RTC active throughout the Summer Holidays.
Apart from giving the Time and Date, through *TIME or TIME$ (BASIC 4), the RTC has many of the AUTO-CONFIGURE features of the MASTER 128K with the same command syntax, a friendly DESKTOP program for use with the AMX MOUSE, a DIARY and a Calculator.
Many additional commands are background commands, leaving your computer free to run your program. They set the time, display the clock in any screen mode, bleep at specified time, interrupt and show a message when you have an appointment, perform a specified task at specified time etc.
You can even 'Clock Boot' your computer directly into the DESKTOP, using the MOUSE you can operate the computer without touching the keyboard (ATARI-ST style) until you 'click' on a language ROM or an application program. You can pop down the pocket size calculator, change the time and edit your DIARY (instead of using a word processor).
The Real Time Clock will add fun and convenience to the every day use of your BEEB.

| | |
|---|---|
| Order as CLOCK | £29.00 |

## THE SOLIDISK BOOKCASE

| Title | Price |
|---|---|
| Programming the 6502 | 16.95 |
| Advanced BASIC ROM for BBC | 9.95 |
| Advanced User Guide | 15.95 |
| BBC User Guide Binder | 4.00 |
| BCPL User Guide | 15.00 |
| Introduction to Comal | 10.00 |
| Logo Reference Manual | 7.50 |
| Termulator Manual | 10.00 |
| Lisp on the BBC Micro | 10.00 |
| View Guide | 5.00 |
| View 3 Manual | 10.00 |
| Viewsheet User Guide | 10.00 |
| Mastering Amstrad 8256 8512 | 8.95 |
| dBASE III Advanced prog ing | 21.45 |
| CP M programmers Encyclop | 18.45 |
| CP M Plus Handbook | 13.95 |
| IBM PC-DOS Handbook | 17.95 |
| Introduction to Wordstar 2000 | 17.95 |
| Mastering Wordstar in IBM PC | 18.95 |
| Assembly Lang for the IBM PC | 22.95 |
| Business Graphics for IBM PC | 9.95 |
| Working with dBASE II | 9.95 |
| 1-2-3 for Business | 16.95 |
| Symphony Tips Tricks & Traps | 19.45 |
| Using 1-2-3 (2nd Ed ) | 18.45 |
| Using Microsoft Word | 15.45 |
| Using DOS Plus Amstrad PC | 9.95 |
| Programming the 8086 8088 | 16.95 |

| Title | Price |
|---|---|
| 6502 Development Pack | 7.50 |
| Advanced Disc User Guide | 16.95 |
| Advanced User Guide Binder | 4.00 |
| Forth on the BBC Micro | 10.00 |
| ISO Pascal Reference Man | 10.00 |
| Introduction to Logo | 10.00 |
| BASIC ROM User Guide | 10.00 |
| Micro Prolog Reference Man | 10.00 |
| S-Pascal Manual | 7.50 |
| Into View | 5.00 |
| Viewstore Manual | 10.00 |
| 6502 Applications | 13.95 |
| Using Word 2000 | 16.45 |
| dBASE III A Practical Guide | 10.95 |
| CP M Bible | 16.50 |
| MS-DOS Bible | 19.95 |
| Introduction to Wordstar | 17.95 |
| Wordstar Users' Ref Manual | 12.50 |
| Mastering 1-2-3 (2nd Ed) | 19.95 |
| Programmers Guide to GEM | 19.95 |
| Advanced prog dB II III | 24.95 |
| Advanced Techniques dBASE II | 22.95 |
| Symphony Macros and Cmd Lang | 21.45 |
| Turbo Pascal for BASIC Prog s | 13.95 |
| Using Lotus Symphony | 22.45 |
| dBASE III Plus Handbook (2nd) | 18.45 |
| Using GEM on Amstrad PC | 12.95 |

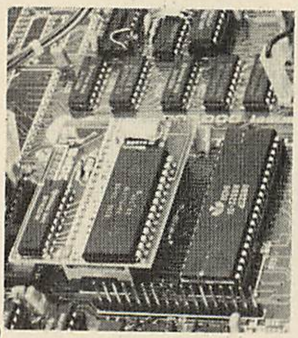
This is just a selection of the books available through the Solidisk Book Case. If you want a Computer title that is in print, please call us for availability and price. Please don't forget to add post and packing to any amount enclosed for an order from the Solidisk Book Case.

SOLIDISK NEW DEVELOPMENTS

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

# SOLIDISK BUDGET DISC SYSTEMS

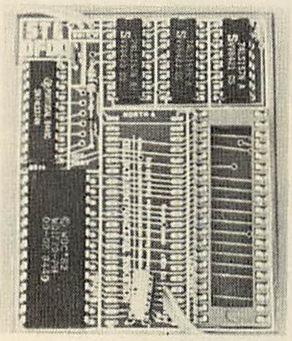
## Double density disc interface



Solidisk very popular Double Density Disc Filing System (DDFS) is based on the WD-1770 floppy disc controller, the same chip used on the Beeb-Plus and the Master series, totally hardware compatible with Acorn 1770 DFS and ADFS ROMs. The DDFS is suitable for virtually any type of floppy disc drives, 3½" and 5¼", 40 track and 80 track, single and double-sided with or without power supply unit. New low price without DFS ROM .......................................... £35.00 (order as XR/DDFS)

## 1770+8271, dual floppy disc controller interface

Solidisk DFDC (1770+8271) is the best seller in disc upgrades for Model B's already fitted with an INTEL 8271 chip (Acorn, Watford, Pace, Viglen, Cumana etc). It plugs into the 8271 socket with the latter relocated on the DFDC itself. This is the most convenient way of adding the modern and powerful 1770 without sacrificing the 8271 chip. The DFDC is fully hardware compatible with both Acorn DNFS 1.2 and ADFS ROMs, as well as Solidisk DFS 2.2 and ADFS 2.1 ROMs. The Acorn DNFS 1.2 is recommended for use jointly with the Solidisk ADFS 2.1 as both systems 'self-frugalise' to keep PAGE at the lowest value. We recommend the DFS 2.2 ROM alone if ADFS is not required. New low price without DFS ROM ............. £40.00 (order as XR/DFDC)

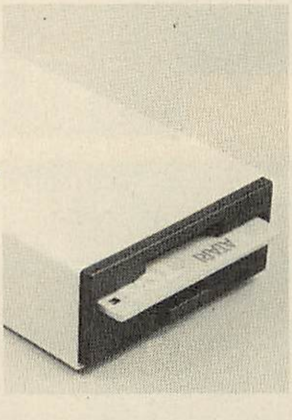


## Low cost 3 ½ inch disc drives

The new generation of THIRD HEIGHT 3 and a half inch Floppy Disc Drives offers unprecedented value for money. They feature Double-sided, 80 track per side mechanism offering up to 640K per disc in double density and ADFS. Low power, large capacity, extremely quiet mechanism, robust media and LOWER PRICE than 5 and ¼ drives make them irresistable. They are also the newly adopted Acorn disc standard. Cased, all leads. One year guarantee.

Order as 3.5 INCH-DRIVE (80 track/Double-sided) ......... £90.00

FREE demonstration diskett (double sided) in DFS format while stock lasts (containing a Database, a Word-processor and a selection of games and disc utilities). Separate power supply for BBC Model B, issue 2 or Electron is available at £25.00. Order as 3.5/PSU.



## Special leads

A Special set of leads to connect TWO drives in ANY combination of 5¼ and 3½ drives is available separately at only £15.00 or only £8.00 surcharge if supplied in lieu of standard leads. Order as SPECIAL LEADS.

## Advanced disc filing system ROM-set (two 16k EPROMS) version 2.1

The finest product yet for any BBC computer fitted with the 1770 Floppy Disc Controller (Model B, Plus and Master 128K and Electron) encompassing many Master 128K specifications. The list of features is so extensive that it would require a lot more space to describe it. In brief, it has ALL the features of the 2.2 DFS ROM except device drivers for the INTEL-8271 chip, full ADFS implementation comparable to the MASTER 128K. Plus ADFS-FORMAT (FORM40, FORM80 and FORM160) and VERIFY. Plus MVDFS and MVADFS to transfer files between DFS and ADFS formats with automatic PAUSE for disc change rendering possible to operate with a single drive. Low PAGE value. Compatible with 6502, Z80, 32016, 80186 (Master version) Second Processor. Two manuals.

Normally £30.00 but if order with DDFS or DFDC only ......... £20.00

Please mention computer model when ordering. Order as ROMS2.1S. Also available on a single 32K EPROM as ROM2.1/32.

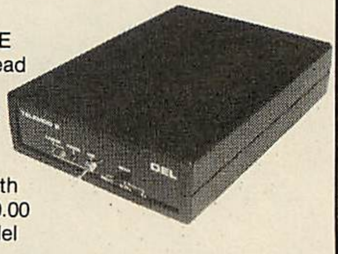



## Single and double density disc filing system ROM version 2.2

The most powerful and versatile DFS ROM available for the BBC model B, the BBC Plus and the Master 128K. Suitable for both 8271 and 1770 Floppy Disc Controller. Double density allows up to 60% increase over conventional format or 640K storage per (80 track double-sided) disc. Extensive features include 40 and 80 track software switch, unlimited filenames in catalogue (as opposed to Acorn 31), automatic Read after Write. It works with Z80, 6502 second processors and Econet and also is very fast on comparative review benchmarks. Built-in commands include FORMAT (F40 and F80), VERIFY, DZAP, MZAP, RECOVER, RESTORE, WORD, RTRACK, WTRACK etc. . . Also, ENABLE M allows IBM PC discs to be read or written to. Extensive User Manual covers many technical details. Supplied on 16K EPROM.

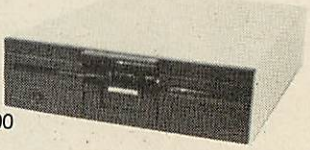
Normally £15.00 but if order with DDFS or DFDC only ......... £10.00

Please mention computer model when ordering. Order as ROM2.2.



## Unbeatable quality 5 and ¼ inch disc drives

Also available are NEC or MITSUBISHI 5 and ¼ inch, 80 track, double-sided drives at a very attractive price. Cased in matching cream colour, all leads. Only ...................... £109.00



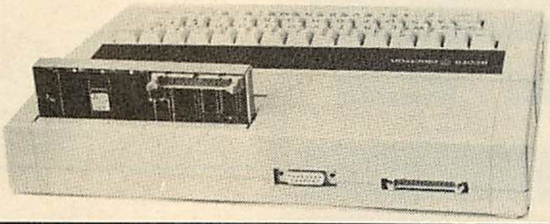
## Free bridge unit for twin drive systems

If you pay for two drives on a single order, we will offer you, absolutely FREE this practical BRIDGE unit. Solid steel construction, suitable for all Models of BBC and Master 128K.

**SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).**

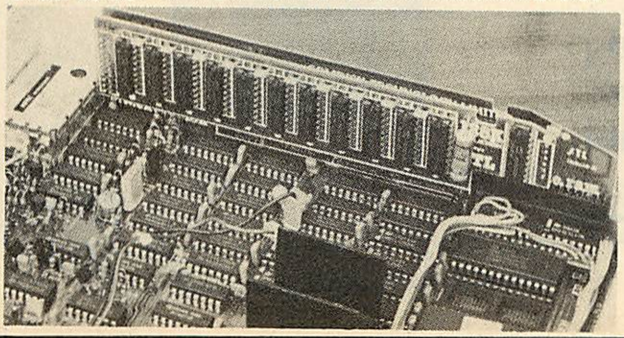
## Electron Disc Interface:

This unit (EFS) plugs into the PLUS-1 Expansion and allows connection of a twin disc drive system and a Winchester. The Disc Interface is based on the same WD1770 chip as used on the Beeb. The Electron Disc Filing System software in ROM (32K) is a version of the Solidisk ADFS 2.1 thus offers a large degree of compatibility with Beeb software. The system is capable of both Beeb DFS format (single and double density) and ADFS format as used on the Acorn PLUS-3. The unit also has a 16K of Sideways RAM which can be used to load ROM images. The unit is guaranteed for one full year but we warn the users that the built-in Sideways RAM is UNRELIABLE hence the reduced price of only: ........................................................................£50.00.
Use a disc system with built-in power supply unit.



## Old Style SWR32 and 128K:

This exceedingly popular system (30,000 plus units sold) enables the Beeb user to load one or two ROM images into the Beeb, make a 16K printer buffer, use DFS with PAGE at &E00, play games, run bigger BASIC, store music and inumerable other uses as supported by a library of 15 software diskettes.
The SWR32 system consists of a BASE UNIT which plugs into the rightmost ROM socket on the BBC board and a (exchangeable) RAM CARD. The RAM CARD also has extension socket for a piggy-back memory board capable of bringing the extra memory to 128K bytes of RAM.
This system is now superseded by the new FOURMEG series and therefore offered at a knock-down price of ONLY £20.00 for a complete unit, excluding software. The 96k add-on piggy-back memory board is also greatly reduced.
Order as SWR32 ........................................................ £20.00
Order as SWR128 (SWR32 with 96K extension) . £50.00
NB: Manual supplied but software (not strictly required) not included.
The supportive software is a series of 15 diskettes, available on either 40 or 80 track DFS diskettes. You can buy any number of VOLUMES although we recommend you buy by PACK of FIVE volumes. PACK 1 (volumes 1 to 5) contains general applications such as MENU, PRINTER, DFS0E00, SILEXICON etc. PACK 2 contains programming applications (SOLIMON, SOLITRACE, TELETEXT EDITOR, SPRITES, DFS and ADFS etc). PACK 3 contains exclusively computer games. Each diskette is priced at only £2.00, software PACK is £10.00 for 5 diskettes.
Order as VOL. XX ................................................. £2.00
Order as SOFT/PACK 1 or 2 or 3 ....................... £10.00



## Secondhand Refurbished Beebs:



As a result of the Solidisk MASTERPLAN, we have to dispose regularly of SECONDHAND, refurbished, complete with Double Density DISC INTERFACE, thoroughly checked and fully guaranteed (Labour only) BBC Model B's. Price vary with issues and ages, commencing from £150.00. Please ring for brochure.

## In Brief:

The range of Solidisk Add-Ons for the Beeb is quite extensive. For example: TWOMEG-32K ... £50.00, FOURMEG-32K ... £70.00, SWR64 with S/W pack 1 ... £60.00, SWR128 (new style) with S/W pack 1 ... £80.00, FOURMEG-256K with WORDWISE PLUS ... £175.00, DDFS (1770) ... £35.00, DFDC (1770+8271) ... £40.00, DFS 2.2 ROM ... £15.00, ADFS 2.1 ROM set ... £30.00, 3½ inch (80 track double sided) drive ... £90.00, 5¼ inch drive ... £109.00, 20MB Winchester with PSU ... £745.00, Linemaster communication ROM ... £10.00, Insight intelligent disassembler ROM ... £15.00, Solimon machine code monitor ROM ... £10.00, Toolkit ROM ... £10.00, S/W pack (1 to 3) of 5 discs ... £10.00, 2764 EPROM ... £1.00 each, 27128 ... £3.00, 27256 ... £6.00, EPROM programmer for 2764/27128 .. . £19.00, EPROM programmer for 27256 ... £21.00, EPROM Eraser ... £20.00.

## Order Form

**ITEM** **PRICE**

**1)** ..........................................................

**2)** ..........................................................

**3)** ..........................................................

**ADD post and packing** ........................... **£2.00**
**(£3.00 for disc drive)**

**TOTAL:**

**Name** ..........................................................

**Address** ..........................................................

..........................................................

**Access/Visa Account** : : : : : : : : : : : : : : : : : : :

Send to:

**Solidisk Technology Ltd**
17 Sweyne Avenue, Southend-on-Sea
Essex SS2 6JQ

We reserve the right to change prices and specifications without notice for improvement.

# SOLIDISK AUTUMN SALE

# SOLIDISK SHOP IN ESSEX

## System One: COMPACT

A Master COMPACT 128K, two 80-track, double-sided (1.3 MB) 3.5 inch disc drives (a must even for copying ADFS file to another disc), a choice of Mono or Colour monitor, free Solidisk Double Density DFS Master Version ROM to run thousands of BBC programs, free DATABASE and SPELLING CHECKER disc.

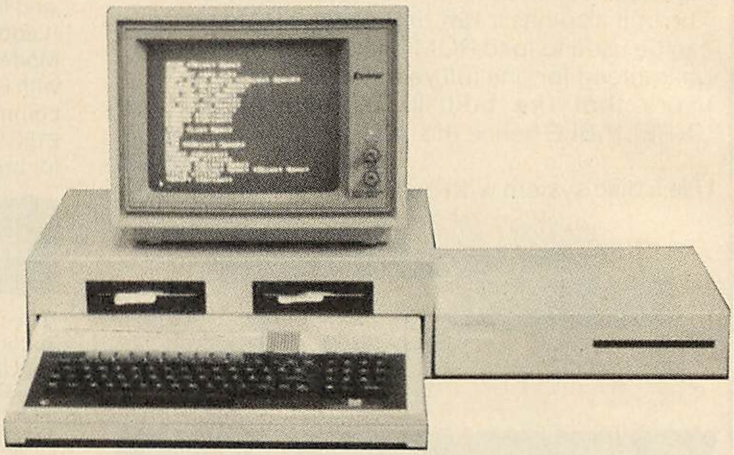
As illustrated with Acorn Mono monitor .................... £598.00
With Acorn Colour monitor .................... £749.00
MP165 printer if bought together .................... £220.00



## System Three: MASTER 512K with 80186

A MASTER 128K internally upgraded with the 512K-80186 co-processor, twin 1.3 Megabyte disc drives, 20 MB Solidisk Hard Disc and special ADFS/Double Density DFS ROM, GEM and MASTER software packages.

As illustrated (without monitor) .................... £1600
With MP165 NLQ printer .................... £1800
With Juki 6100 Daisy Wheel printer .................... £1880

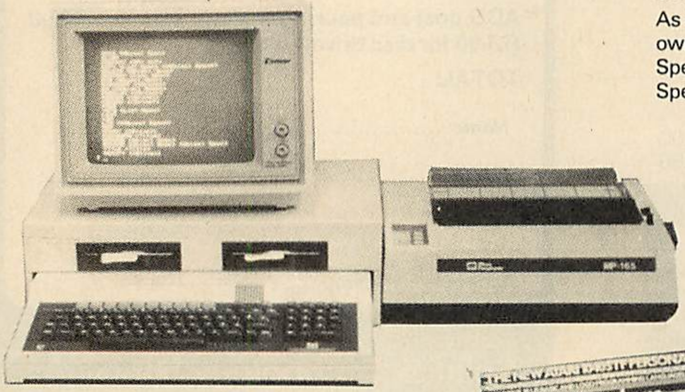


**Pick any of these Four, and you are sure to get every penny's worth. You'll get more than just the lowest ever prices: a flexible trade-in scheme, free telephone support and free software are in the packs."**

## System Two: MASTER

A fully blown MASTER 128K, twin 80-track, double-sided 1.3 Megabyte Disc Drives in a bridge unit doubling as a monitor stand, free MEGAGAMES, DATABASE and SPELLING CHECKER in 5 discs.

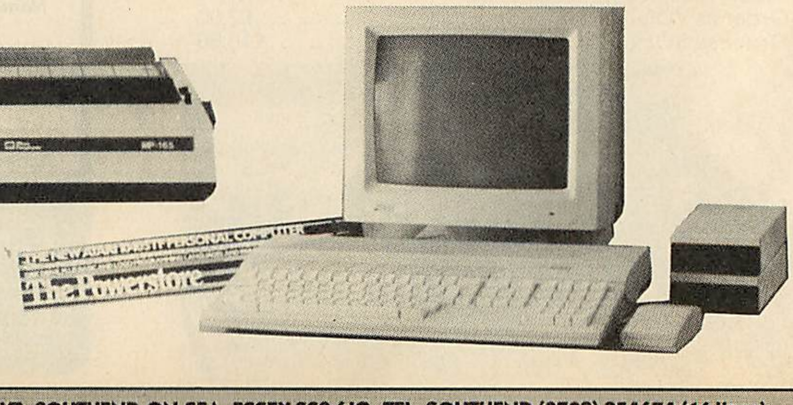
As illustrated (without monitor) .................... £660.00
With MP 165 printer, 165 cps, NLQ, EPSON compatible (even the ribbon) .................... £880.00



## System Four: 520 STM

ATARI slogan is 'Power without the Price'. This is specially true with this 520-STM computer, 16 bit 8MHz-68000 CPU and 512K of RAM, hard disc connector, RS232, Midi interface, printer port and Mouse. The bundled software includes GEM (as on the MASTER 512), word-processor, Basic, Logo and CPM emulator. More information is available on request. Two 80 track, double sided 3.5 inch drives (1.5 Megabytes) complete this system.

As illustrated (without monitor), you use your own TV set .................... £540.00
Special price for MP165 NLQ printer and lead .................... £240.00
Special low price on 20 MB ATARI ST Hard Disc .................... POA



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## Printers

| Code | Description | Price |
|---|---|---|
| P101 | EPSON LX80 + 2 M printer lead | 220.00 |
| P101TF | LX80 Tractor Feed | 21.30 |
| P101SF | LX80 Cut Sheet Feeder | 53.53 |
| P102 | EPSON FX85 NLQ + 2M printer lead | 350.00 |
| P102TF | FX85 Tractor Feed | 30.59 |
| P102SF | FX85 Cut Sheet Feeder | 123.50 |
| P103 | MP165 — 165 cps + NLQ + 2M printer lead star buy* | 260.00 |
| P103R | Black ribbon for LX80, FX85 and MP165 | 4.60 |
| P104 | JUKI 6100 Daisy Wheel + 2 M printerlead star buy* | 340.00 |
| P104R | JUKI 6100 black vinyl printer ribbon | 2.30 |
| P105 | Panasonic KX-P1080 + 2 M printer lead | 165.00 |
| P106 | Kaga KP 810 + 2 M printer lead | 240.00 |
| P100P | 2000 sheets cont. paper, A4 size 11"×9.5" | 14.00 |

## Monitors

| Code | Description | Price |
|---|---|---|
| M101 | 12" Phillips BM7502 hi-res green screen, BNC lead | 85.00 |
| M102 | 12" Phillips BM7522 amber, BNC lead star buy* | 86.00 |
| M103 | 12" TAXAN Supervision 3, hi-res RGB RGB lead | 375.00 |
| M104 | 12" TAXAN Supervision 2, hi-res RGB RGB lead | 315.00 |
| M105 | 14" Mitsubishi XC1404, RGB lead star buy* | 260.00 |

## Diskettes

| Code | Description | Price |
|---|---|---|
| C100 | 5¼" low cost VEREX for all drives | 12.00 |
| C101 | 5¼" hi-rel MD557, Verbatim DSDD 96 tpi | 25.00 |
| C102 | 3.5" low cost Verbatim for all drives | 20.00 |
| C103 | 3.5" hi-rel 90097M Verbatim DSDD 135 tpi | 28.00 |
| C104 | 3" CF2/MSOFT for all Amstrad drives | 39.00 |

## Acorn Co-processors

| Code | Description | Price |
|---|---|---|
| C110 | Master Turbo | 113.00 |
| C111 | Master 512K-80186 and software bundle | 375.00 |
| C112 | 32016, 6MHz, 8MHz and 10MHz | POA |
| C112A | Solidisk ADFS ROM for 6MHz-32016 | 20.00 |
| C120 | M128K Econet Module | 46.50 |

## Order form

All prices are inclusive of VAT at 15% but excluding delivery. We reserve the right to change without notice.

: .................. System .............. Price [ ]

Add delivery £10.00 per system [ ]

TOTAL [ ]

Name: ..........................................................

Address: ..........................................................

..........................................................

..........................................................

Visa/Access ..........................................................

Send to:
**Solidisk, 17 Sweyne Ave, Southend-on-Sea, Essex SS2 6JQ**

# "If you have a good working BBC Model B already expanded with Solidisk DFS, or Disc Drives or Sideways RAMs, then this "MASTER PLAN" is designed for you"

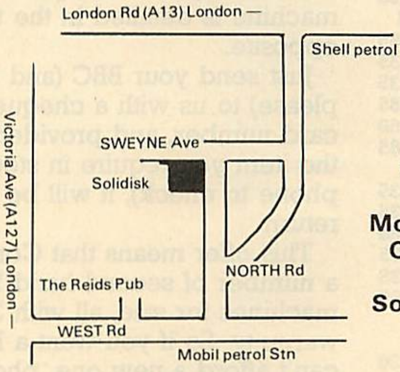
**The Solidisk MASTERPLAN is specifically set up to reduce financial burdens to all Solidisk loyal customers, as much as possible.**
**Fill in carefully the coupon below and send it to us. We will immediately send you a personalized quotation for upgrading your BBC B to the Master which we are sure you will find really hard to refuse . . .**

## MASTERPLAN COUPON

Please tell us about your BBC Computer:
1) Issue and Age ..........................................................
2)Upgrades fitted inside:
a) ..........................date ......................by ......................
b) ..........................date ......................by ......................
c) ..........................date ......................by ......................
d) ..........................date ......................by ......................
3) Service history:
a) has never gone wrong (tick box) : :
b) Serviced as follows:
: ..........................................................
: ..........................................................
: ..........................................................

Please fill in your name and address using the order form printed opposite. Send the complete Order Form — Masterplan Reply coupon to Solidisk. Allow 3 working days for your quotation.

## *Come and See Us*




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# COMPUTERS AT XMAS PRICES

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# BUSINESS

## NEWS

### Access to gold

Members of Prestel and Micronet now have access to Telecom Gold mailbox services. New software in the Prestel system allows conversion of Telecom Gold messages to the standard used by Micronet. Users have to subscribe to both services. Further details from Micronet, 8 Herbal Hill, London EC1R 5EJ.

### Paper power

US company Datagraphics has started Paper Power to produce custom printed continuous stationery for business micro users in the United Kingdom. Datagraphics can produce letterheads in a wide variety of widths and lengths and colours.

### Static protection

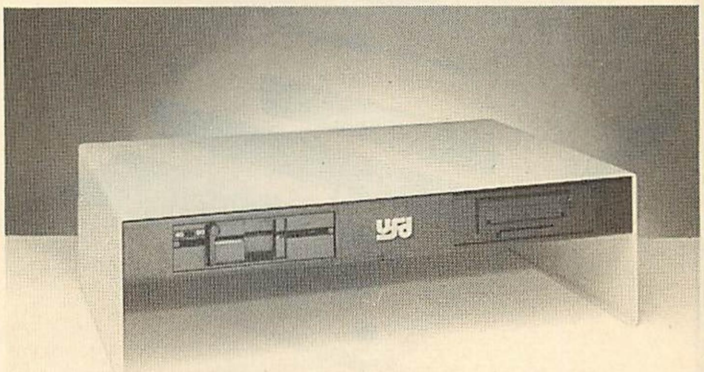
Valuable data lost through static electricity is a problem of the past thanks to the Static Buster from Integrity Solutions. It connects the micro and monitor to an earth point and protects both from possible harm. It costs £49.95 from Integrity Solutions, 504 Manchester Road, Rochdale, Lancs., OL11 3HE.

### Filter screens

Kores Nordic claims its range of YIS VDU filter screens cuts our eye irritation and fatigue caused through using a micro for long periods. The filter screens are available in a range of sizes and simply sit on a monitor without the need for special attachments. Prices start from £112 for a 9in filter.

Details from Kores Nordic, West Road, Templefields, Harlow, Essex, CM20 2AL.

## Networking alternative



Technomatic claims most BBC micro network owners are realising only a small fraction of their equipment's potential. Technomatic's Jay Mehta said most networks have only a small number of micros and are used only to share common storage, such as a hard disc drive and to transfer data. Other facilities, he said, are rarely fully used.

Technomatic is offering a low cost alternative to companies considering networking BBC micros. The Winchester Drive Multiplexer unit enables up to four BBC micros to share a single Winchester hard disc drive. Technomatic claims the saving in cost over a number of floppy disc drive machines can easily pay for the purchase.

In use, the Multiplexer enables each user to save and load data files from the Winchester drive, as though from their own drive and to transfer data from one user to another.

Mehta said the Winchester Drive Multiplexer is compatible with all Winchester drives currently available for the BBC micro. It requires each machine to be equipped with the ADFS and ready to support a Winchester drive. The Winchester Drive Multiplexer is available in two and four micro versions. The units cost £114 and £183 respectively. Further details from Technomatic, 17 Burnley Road, London NW10 1ED. Tel: 01-208 1177.

A new Winchester disc unit suitable for the Multiplexer is the Nucleus from Akhter. It combines a 20Mb or 40Mb hard disc drive, 1Mb floppy disc drive and 10Mb tape streamer into a single unit designed to sit on top of a micro as a monitor stand.

The 20Mb Nucleus costs £1,599.95 and the 40Mb version £1,999.95. Details from Akhter, Akhter House, Perry Road, Staple Tye, Harlow, Essex, CM18 7PN. Tel: (0279) 443521.

## Printer buffer for BBC micros

A printer buffer from Fernwood Electronics allows up to eight micros to share an RS232 printer, plotter or modem. The M806 automatically routes data to the printer. The buffer continually polls the micros connected to it. Data sent from any micro is detected and switched through to the output device, or queued if there is other data routed through the system at the time.

The M806 is available in two versions for four or eight micros and with a range of buffer sizes from 6k to 256k to free the micro within seconds when using any RS232 output device. Prices range from £275 for the four-micro 6k version to £725 for an eight-micro 256k buffer.

Further details are available from Fernwood Electronics, Kingwood, Henley-on-Thames, Oxon, RG9 5NB. Tel: (0491) 7549.

Microtest has a new printer buffer for BBC micro users. The Model 325 has a 64k memory which is enough for about 20 pages of text, claims Microtest. The model 135 has a parallel Centronics input interface for connection to a BBC micro, and both Centronics and RS232 output connectors for connection to a parallel or serial printer or plotter.

The Model 325 is supplied with its own power supply and retails at £164 from Microtest, 18 Normandy Way, Bodwin, Cornwall, PL31 1EX. Tel: (0208) 3171.

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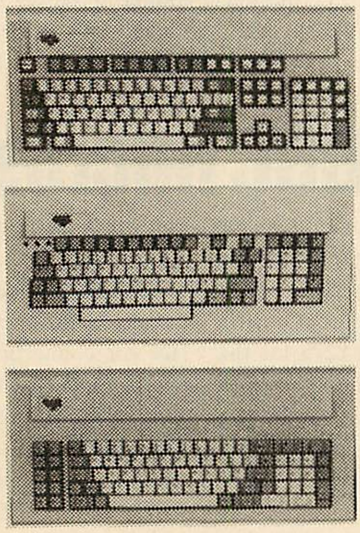
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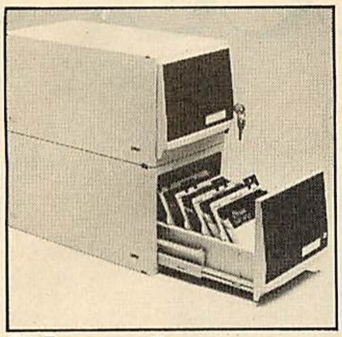
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## Disc storage

Action Computer Supplies has released a novel disc storage and filing box, claimed to protect discs from physical or static harm and provide easy access. The Multiform boxes are like miniature filing cabinets which can be used individually or stacked together. An automatic locking device prevents more than one drawer opening at a time. The basic Multiform costs £31.90 and the lockable version, £36.70.

Details from Action Computer Supplies, Abercom Trading Estate, Manor Farm Road,

The Floppistore from Ben Johnson Ltd can store all your discs cheaply and efficiently. Based on Ben Johnson's range of professional software packaging, Floppistore holds up to 20 discs along with catalogue and notes in a ring-bound book. Six colours are available. The Floppistore costs £11.25 from Ben Johnson Ltd, 4 Devonshire Square, Cutlers Gardens, London, EC2M 4YD. Tel. 01-623 5244.

# Dot and daisy get together

Brother's Twinriter 5 printer has all the advantages of both a daisywheel and a dot matrix printer. The Twinriter prints at dot matrix speed and produces documents indistinguishable from typewritten. This is because the Twinriter is both daisywheel and dot matrix driven, with the two print heads side by side.

At £1116 the Twinriter is not cheap but it is really two printers in one. Brother claims the Twinriter can print at 140 characters per second (cps) in draft (dot matrix) mode and at 30 cps in letter quality (daisywheel) mode. The Twinriter is Epson and Diablo compatible.

When the Twinriter is printing with the daisywheel head and asked to print a character not on the daisywheel, it automatically prints the character in a near letter quality (NLQ) using the dot matrix print head, giving the Twinriter a 255 character set including many foreign accented letters and graphics symbols.

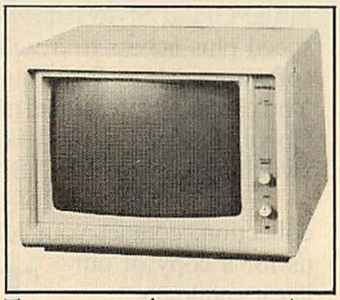



Further details from Brother, Shepley Street, Guide Bridge, Audenshaw, Manchester, M34 5JD. Tel: 061-330 6531.

Epson has released replacements for its popular FX-85 and FX-105 printers. The new models, called FX-800 and FX-1000, offers 200 characters per second in draft mode and 40 cps in NLQ mode.

The FX-1000 is a wide carriage version and both have tractor feed plus automatic single sheet loading. The FX-800 costs £472 and the FX-1000 £604. Prices of the FX-85 and FX-105 are being reduced by five per cent to clear stocks.

## Multinational monitors



Two monochrome monitors from foreign parts are available for British BBC micro business users. Hantarex, the Italian company, has added the BIM12 PC to its 'economic range'. It has a 12in screen with P39 green long-persistence phosphor. The BIM12 PC costs £114 from Hantarex, Unit 2, Kangley Bridge Road, London, SE26 5BA. Tel. 01-788 1414.

Meanwhile the French company Thomson, has launched the VM3102. Featuring a 12in flat face screen and high contrast 'dark' tube, the VM3102 is available with green or amber phosphors, both medium persistence. The VM3102 retails at a price of £144.

Details of your nearest dealer from Thomson, Ringway House, Bell Road, Daneshill, Basingstoke, Hants., RG24 0QG. Tel: 0256-23172.

**BUSINESS TOP FIVE**

| | Title | Publisher | Cassette | Disc | ROM | Electron | B+ | Master | 6502 | Econet |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Mini Office 1/2 | Database | £14.95 | £16.95 | — | — | Yes | — | — | — |
| 2 | View/View 3 | Acornsoft | — | — | £89.70 | — | Yes | Yes | Yes | Yes |
| 3 | Datagem | Gemini | — | — | £39.95 | — | Yes | Yes | — | — |
| 4 | Database | Gemini | £19.95 | £23.95 | — | — | Yes | Yes | — | — |
| 5 | Office Mate | Gemini | £12.00 | £12.00 | — | — | Yes | — | — | — |

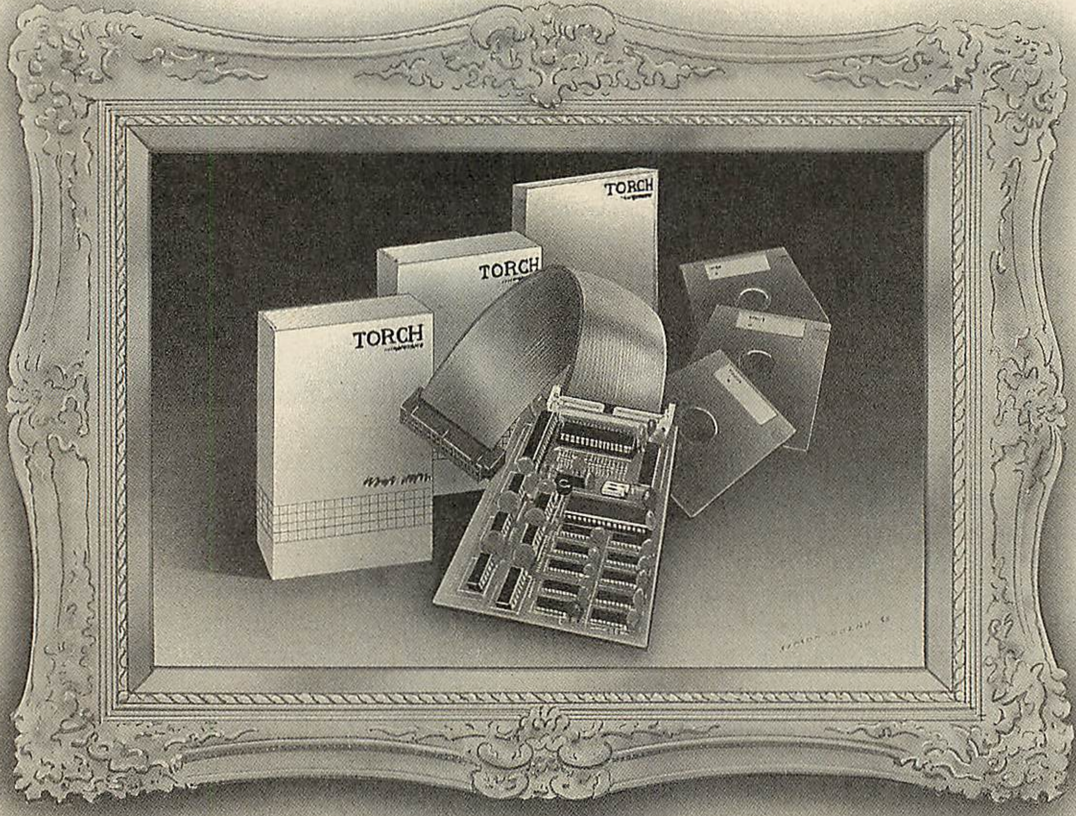
Compiled by Gallop/MicroScope. Publishers: Database Publications, Europe House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY; Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD; Gemini House, Dinan Way, Exmouth EX8 4RS.

## Compact pay

Micro-Aid's *Extended Payroll* program is now available for the Master Compact on 3.5in disc. The *Extended Payroll* can be used as a stand-alone payroll system or integrated with Meadow Computers' *Business Accounts* suite. The program costs £49.95 from Micro-Aid, 25 Fore Street, Praze, Cornwall. Tel: 0209-831274.

# How to recognise a masterpiece

(a new perspective on the BBC Master)



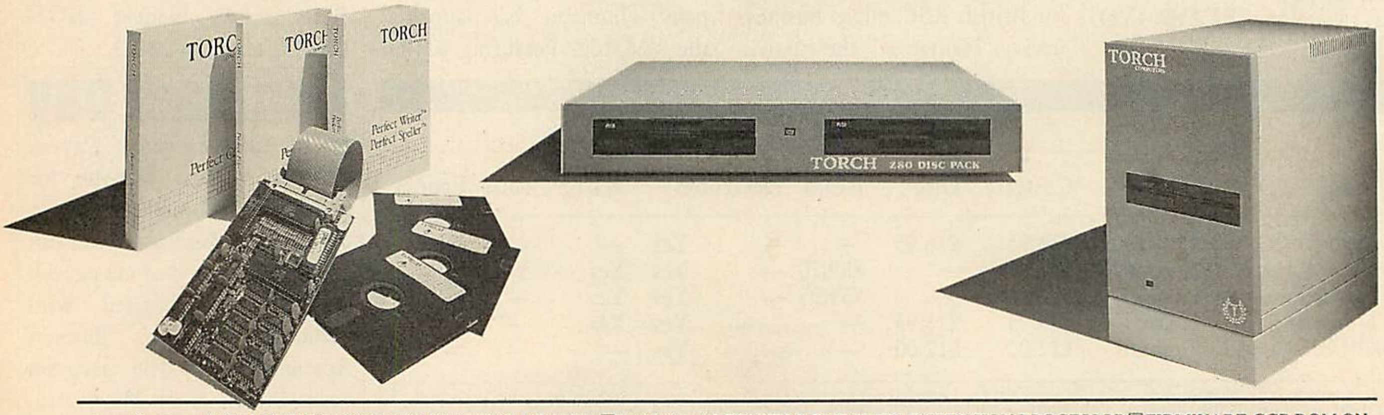

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# BUSINESS

# GRAPHIC EXPRESSIONS

**High quality statistics and graphs can be produced using the following mathematical programs**

**Peter Sandford**

Readers may recall some articles published in January and February 1985, in which routines for presentation of statistical data in the form of pie charts and bar charts were explained. The programs were designed for the production of high quality 'hard copy', for use in written documents, making full use of the high resolution mode 0 screen.

This article follows on with two new programs which utilise the same principles. Dataplt (listing 1) allows several sets of data to be inputted and plotted in graph format, while Graplt (listing 2) can be used to plot and explore the values of simple mathematical expressions.

Examples of the output of these programs are shown in figures 1 and 2. Next month I will take things a stage further, and look at how these and the previous routines can be interfaced and used with databases and spreadsheets such as *ViewStore* and *ViewSheet*.

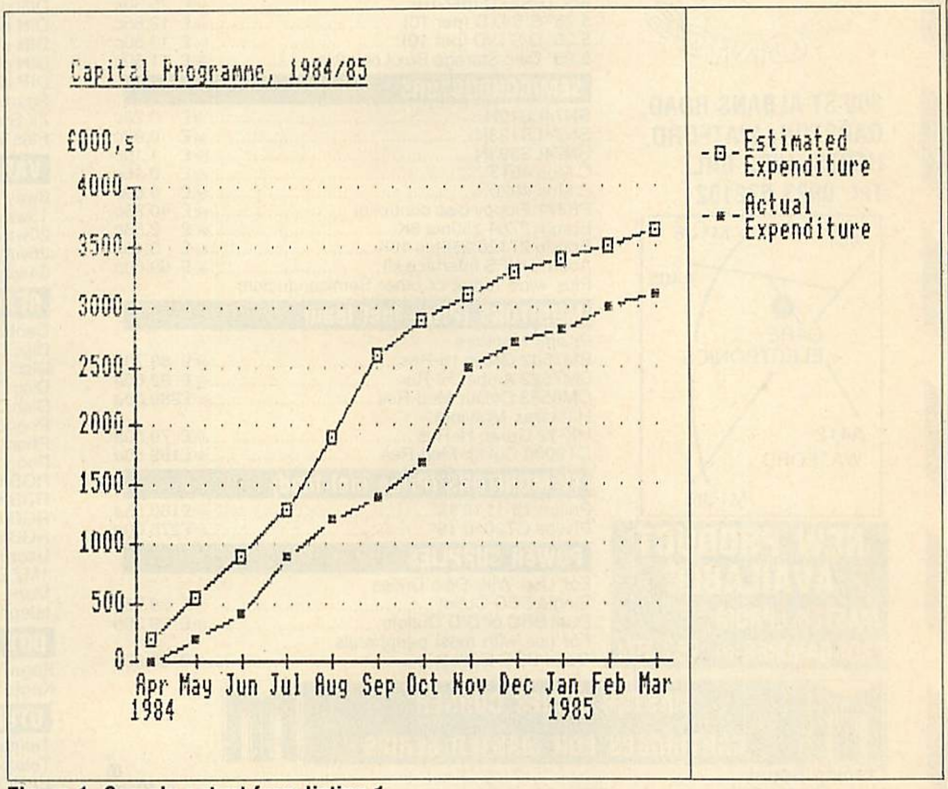



**Figure 1. Sample output from listing 1**

## Plotting data

Listing 1 is the full data plotting routine, 'Dataplt'. Essentially, this allows you to enter up to five sets of data and superimpose them on the same set of graph axes. The axes are automatically scaled, drawn and labelled. Each set of data can have up to 40 points plotted, and is distinguished from other sets of data by the use of user-defined symbols to plot each individual point.

On running the program, you will be presented with a cleared screen, split into three separate windows for graphics, key and text. Menu options allow you to start plotting data, to add labels, to perform a screen dump or to load or save previously completed screens.

Note the vertical axis is automatically scaled and anotated according to the step size and maximum and minimum values specified. The horizontal axis, however, is simply marked with a series of crosses to correspond with each data point. Labelling of this axis must be done manually, using the labelling option from the screen menu.

Lines 10 – 1590 of Dataplt are based on the original pie chart and bar chart plotting routines, with a number of minor enhancements. The most notable is the labelling routine, which now offers a simple line drawing option. This can be selected on entry to the routine. The start and end points of the line to be drawn must be marked by moving the cursor and then pressing Return.

A further improvement is the addition of a soft audible 'blip' on entry of data or positioning the cursor. The program notes give full details of how the original bar chart and pie chart listings can be amended to incorporate these additions.

## Original listings

For those who don't have the original bar chart listings from January and February 1985, two fully revised versions are included in this month's listings cassette and disc. These have also been amended and updated to incorporate the more sophisticated axes plotting and labelling routines developed for the Dataplt program.

## Mode 0 graphics problems

Before introducing the second program listing, it is useful to consider some of the characteristics of using graphics in mode 0. This mode offers the highest resolution available on BBC micros, with an 80 column screen width for text, which is essential for producing professional quality diagrams and labelling. It does, however, offer certain disadvantages when aiming for the highest standards of graphics work. This arises from the fact that each pixel plotted in mode 0 is effectively twice as high as it is wide, unlike 40 column modes where each pixel is square. This has the effect of making vertical lines appear thinner than horizontal ones. While this is not always apparent on screen, it becomes clear when using an accurate screen dump. The effect is very pronounced when plotting curved lines or circles.

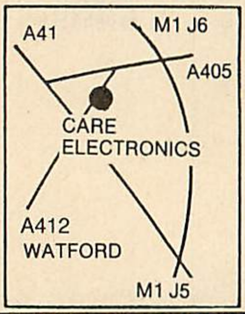
This characteristic of mode 0 graphics also affects the appearance of user-defined characters on screen. A character defined to appear as a perfect circle or square in

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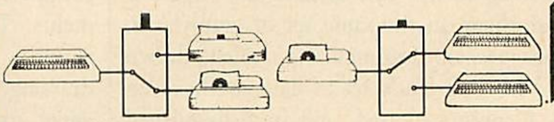
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Access

any 40 column mode will appear squashed and distorted in mode 0.

Both programs presented here have been written to minimise this effect, and make use of a simple line plotting procedure, PROCdraw, to ensure that all vertical or slanting lines are of equal width to horizontal ones. This simply plots each line as two adjacent lines, displacing one graphics position either side of the specified X co-ordinates. Although this does slow line plotting down, it lends a more professional appearance to the final presentation.

For the same reasons, the user-defined characters used to plot each point in Dataplt are based on a matrix eight pixels wide but only four pixels high, so that they appear perfectly symmetrical when displayed in mode 0 and when the screen is dumped to a printer.

## Plotting graphs

The second listing, Graplt (see yellow pages), is a development from Dataplt and allows you to plot the graphs of simple mathematical equations. Up to five equations can be superimposed on the same set of axes. Each should be entered as a function of X. For example, if you want to plot the graph of Y=X^2, simply enter X^2 in response to the prompt. The X is automatically converted to lower case to label the graph.

Graph plotting programs for micros are nothing new. However, Graplt is purpose-designed to produce high quality copy. It incorporates some quite complex routines which take the hard work out of drawing and labelling the axes. All you need to input is the upper and lower values of X over which you want to plot the equation. The program will calculate a suitable interval for labelling each axis, and will draw and notate them accordingly.

The procedures used to control the labelling of the axes in both Graplt and Dataplt make use of a powerful but little used feature of BBC Basic. This is the ability to use the pseudo-variable, @%, to control conversion from numeric to string values, using STR$.

The use of @% is one of the few aspects of BBC Basic which is poorly documented by the otherwise excellent User Guide. This briefly explains how the field width and format of printed numbers can be controlled by altering the value of the least significant three bytes of @% (page 70 of the User Guide), but omits to explain the effect of the fourth (most significant) byte. As explained in figure 3, this determines whether or not string conversions will be formatted according to the setting of @%.

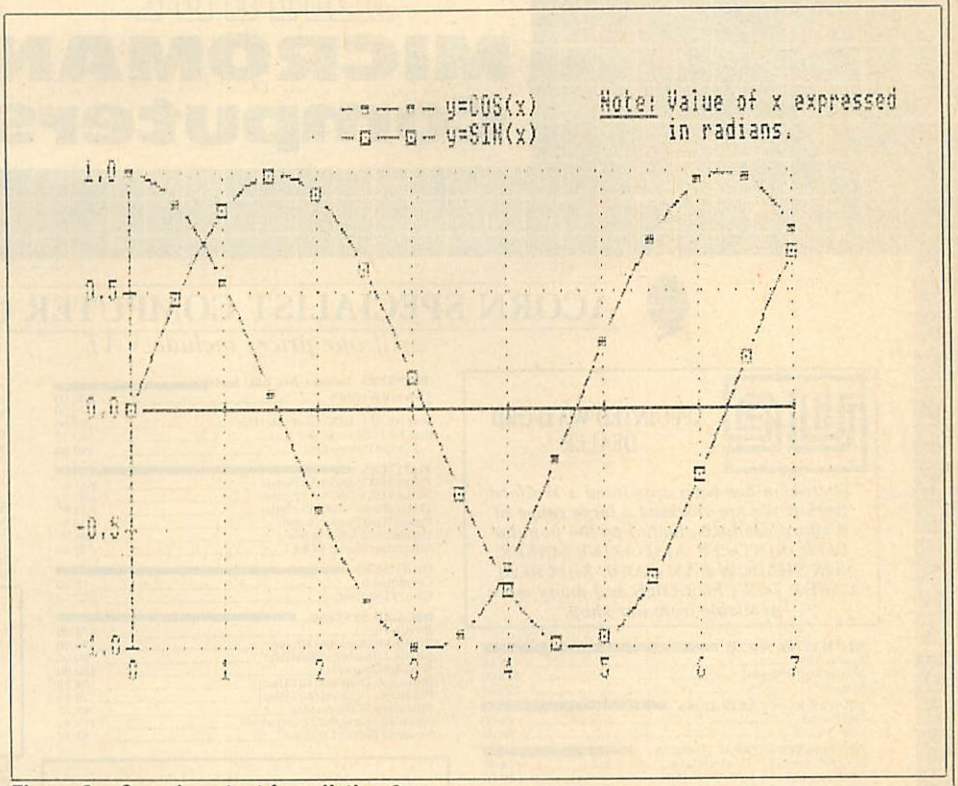



**Figure 2a. Sample output from listing 2**

@% is a four byte integer variable. In hexademical format, the action of each byte is as follows:

@%=&ssffddww

ss (byte 4) controls string formatting. If ss=0 (the default), string conversions are unaffected by @%. If ss=1, string conversion are affected.

ff (byte 3) controls the format. ff=02 gives a fixed number of decimal places, ff=01 gives exponential values, and ff=00 gives 'normal' format.

dd (byte 2) controls the number of digits printed. In decimal format (ff=02) it controls the number of decimal places printed. In normal or exponential format, it controls the maximum number of digits printed in either the number or mantissa.

ww (byte 1) controls the field width.

For instance, @%=1020109 selects decimal format, printed to 1 decimal place, with a field width of 9. String conversions are enabled, and entering A$=STR$ (1.6666) will set A$="1.7". If @% was set simply to &20109, string conversions would be unaffected, and A$=STR$ (1.6666) would set A$="1.6666".

**Figure 3. How @% works**

This feature enables us to harness the sophisticated numeric facilities offered by @% for our own use. This is best illustrated by the following short function definition lines:

```
9000 DEF FNround (n,places)
9010 LOCAL @%
9020 @%=&1020010+100*places
9030 =VAL (STR$ (n))
```

This will take any numeric value, 'n', and return it rounded to the number of decimal places specified by the argument, 'places'. Line 9020 sets up @% to 'print' the required number of decimal places, with string conversion selected by the first (most significant) digit. Line 9030 simply converts the number to a string (using STR$), which will be rounded according to the setting of @%, and then converts it back to a numeric value using VAL.

```
9000 DEF FNround(n,places)
9010 LOCAL @%
9020 n=n*10^places
9030 @%=&1020010
9040 n=VAL(STR$(n))
9050 =n/10^places
```

**Figure 4. Function to round a number**

A slightly more sophisticated version of this function is shown in figure 4. This also allows you to perform rounding of whole numbers by using a negative value for

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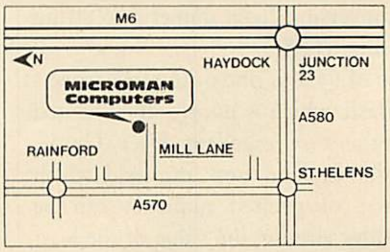
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'places'. In other words, FNround (30466,−1) will return the value 30470, and FNround (30466,−2) will return 30500.

Both Dataplt and Graplt make use of this feature to control the number of decimal places used in labelling the graph axes. FNexp uses @% to convert numbers to a string in exponential format, and then extracts the exponent value from the right-hand side of the string. This is then used to reset @% to either a fixed number of decimal places (if the interval is itself a decimal value) or to general format. This technique allows both programs to cater for virtually any range of numeric values, large or small, that you may wish to plot.

## Memory requirements

Both listings have been developed to run on a BBC model B micro, and should also run without modification on the Electron, B+, 6502 second processor and Master. However, the value of PAGE needs to be moved down to &1100 on an unexpanded model B. Take care not to introduce any unnecessary spaces – if you do experience problems of memory space, the program can be compacted by simply omitting all the spacing lines between procedures.

If you are using tape, or have an expanded memory, line 60 should be deleted. Shadow RAM users will also have to amend the screen load and save procedures at lines 780 and 830.

**Listing 1: Dataplt**

Lines 10–1870 of Dataplt are based on the original pie chart listing published in February 1985. A number of enhancements have been made. The original program can be converted as follows:

1) Delete lines 1600–2400
2) Amend the following lines to match those listed here:
   10–40, 60, 120, 130, 160, 330–350, 380, 660
3) Insert line 980 from Dataplt as line 975 and then RENUMBER
4) Amend the following lines to match those listed here:
   1230, 1320, 1410
5) Enter Dataplt from line 1610 onwards

Note that stages two to four can also be followed to amend the original pie chart and bar chart programs themselves. You will also need to add PROCline and PROCblip, renumbered to fit either at the end or between existing procedures.

**PROCs, FNs and variables**

PROCline: extends label plotting procedure to allow simple line drawing option

PROCblip: sounds 'blip' and clears keyboard buffer at end of data entry

PROCdraw: line drawing procedure to overcome the 'narrow pixel' effect of a mode 0 screen

PROCredefine: defines character used to plot each data point

PROCkey: draws and titles a key to each data set

PROCdrawlabel: used by PROCkey to print title of data set

PROCplotdata: main control routine for data plotting

PROCplot: controls plotting of each point

PROCplotpoint: plots current symbol at coordinates x,y

PROCplotline: draws line from previous specified point

FNxc: calculates horizontal screen co-

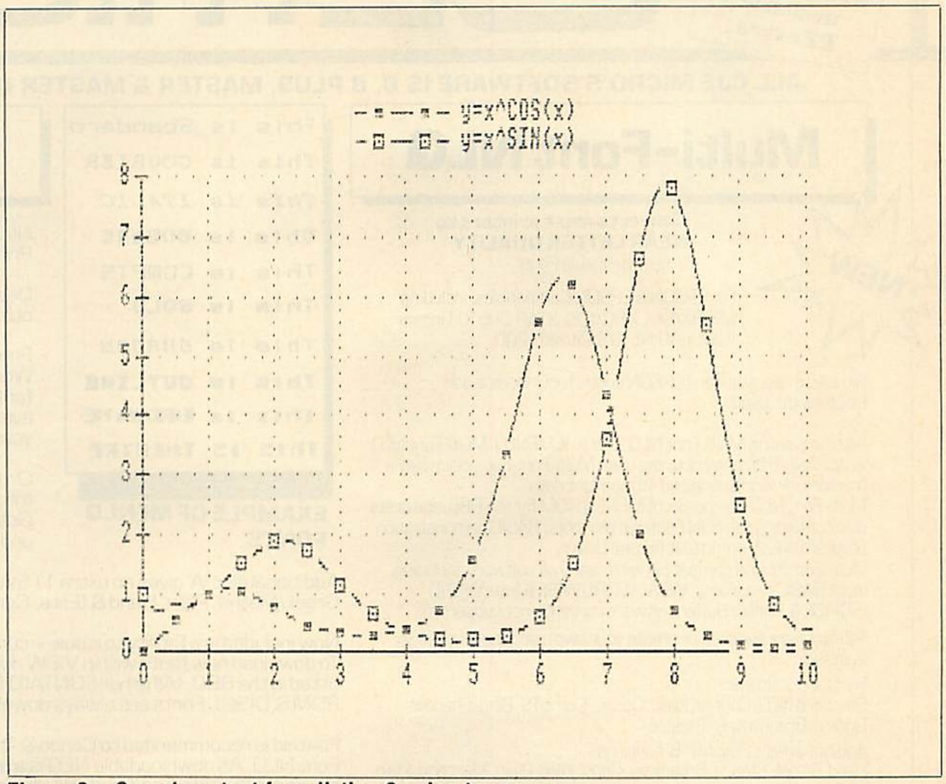



**Figure 2a. Sample output from listing 2 using two axes**

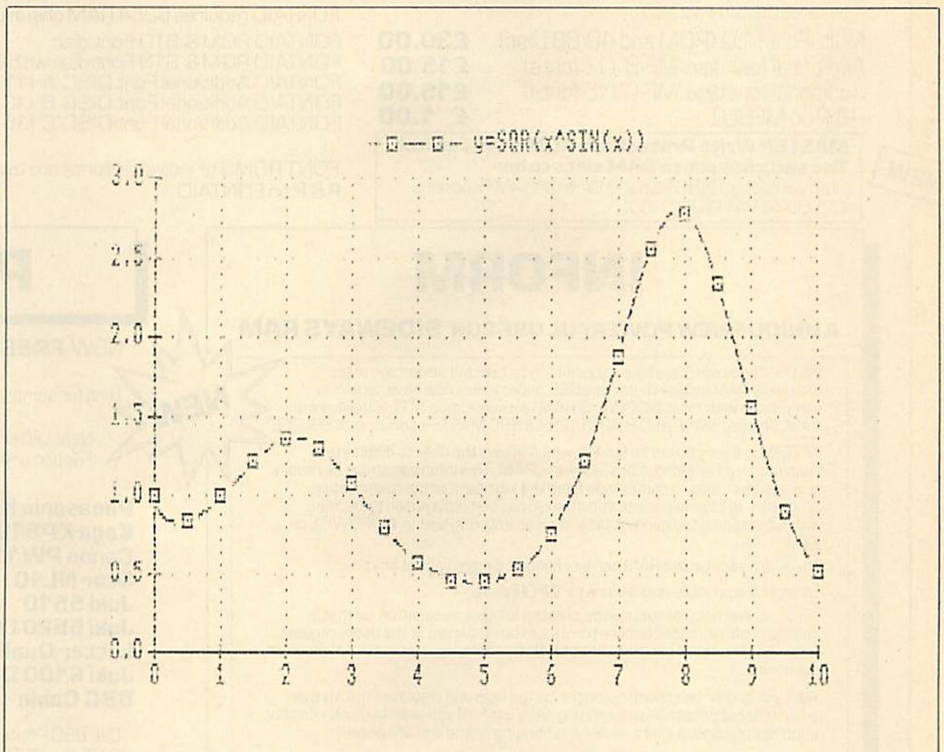



**Figure 2c. Another sample graph from listing 2**

ordinate of point P%
FNyc: calculates vertical screen coordinate according to data value
FNexp: extracts exponent of N using @%
PROCdrawaxes: scales and draws axes

**Listing 2: Graplt**

Graplt shares the same 'core' procedures as dataplt to control screen layout, labelling, loading, saving and dumping of screens (lines 10–1870). Load in listing 1, and delete lines 1880–3100 before adding the lines shown in listing 2 (but note that PROCplotpoint and FNexp are common to both listings and could be retained if you take care).

**PROCs and FNs**

PROCplotfunction: main control routine for plotting function of X
PROCplotline: plots line from coordinates x1 to x2
PROCplotpoint: plot current symbol at coordinates x,y
FNxc: calculates horizontal screen coordinate of point x
FNyc: calculates vertical screen coordinate of point x
PROCymaxmin: calculates maximum and minimum values of y to be plotted
FNinterval: calculates interval to be marked on x,y axes
FNexp: extracts exponent of N, using @%
PROCdrawaxes: scales and draws axes
PROCconvertx: converts string A$ to replace upper case X with lower case.

*The Dataplt program is listed below and on pages 181 and 183. The Graplt listing has been set out on the yellow pages. Next month: how to incorporate these into View Sheet and View Store.*

**The DataPlt program**

```
   10 REM DataPlt
   20 REM by Peter Sandford
   30 REM for BBC B/B+/M/C/E
   40 REM (c) Acorn User January 1987
   50 :
   60 IF PAGE<>&1100 THEN PAGE=&1100:CHAIN"DATAPLT"
   70 :
   80 MODE 0
   90 PROCinit
  100 ON ERROR PROCerror
  110 REPEAT
  120 CLS:PRINTTAB(18)"Data Plotting Utility - Enter Option (1-5)"
  130 PRINT" 1) Plot Data  2) Draw Label  3) Load Screen  4) Save Screen  5) Screen Dump";
  140 K%=(GET OR &10)-48
  150 CLS
  160 IF K%=1 PROCplotdata
  170 IF K%=2 PROClabel
  180 IF K%=3 PROCload
  190 IF K%=4 PROCsave
  200 IF K%=5 PROCdump
  210 UNTIL FALSE
  220 END
  230 :
  240 DEF PROCerror
  250 PROCwindow(0):VDU4:CLS:REPORT
  260 IF ERR<45 AND ERR<>17 THEN PRINT" at line ";ERL;
  270 PRINT" ... Press 'Q' to quit, any other key to continue";
  280 K%=GET AND &DF:PRINT
  290 IF K%=81 VDU23,48,&663C;&7E6E;&6676;&3C;:PROCoscli("FX4,0"):END
  300 ENDPROC
  310 :
  320 DEF PROCinit
  330 PROCwindow(0):PROCcursoroff:*FX4,1
  340 PROCdraw(1,68,1,1023):PROCdraw(1,1023,1279,1023)
  350 PROCdraw(1279,1023,1279,68):PROCdraw(1279,68,1,68)
  360 PROCdraw(952,68,952,1023):PROCwindow(1)
  370 cx=480:cy=875
  380 DIM osblock 35,data(5)
  390 k$=STRING$(25," ")
  400 a$=STRING$(60," "):an$=a$:mess$=STRING$(79," ")
  410 VDU 23,48,&663C;&6666;&6666;&3C;
  420 ENDPROC
  430 :
  440 DEF PROCwindow(w)
  450 IF w=0 VDU 28,0,31,79,30
  460 IF w=1 VDU 24,8;72;944;1016;
  470 IF w=2 VDU 24,960;72;1272;1016;
  480 IF w=3 VDU 24,8;72;1272;1016;
  490 ENDPROC
  500 :
  510 DEF PROCmovecursor
  520 PROCwindow(3):PROCcursor(cx,cy)
  530 CLS:PRINT SPC(4)"Use CURSOR KEYS to position cursor, & press RETURN when ready to proceed"
  540 PRINTTAB(24,1)"Cursor position (X,Y): ";cx;TAB(51,1)",";cy;
  550 xs=2:ys=4
  560 REPEAT
  570 ox=cx:oy=cy
  580 cx=cx+xs*INKEY(-26)-xs*INKEY(-122)
  590 cy=cy+ys*INKEY(-42)-ys*INKEY(-58)
  600 IF cx<8 OR cx>1272 cx=ox
  610 IF cy<72 OR cy>1016 cy=oy
  620 IF ox<>cx THEN xs=xs+2
  630 IF oy<>cy THEN ys=ys+4
  640 IF ox=cx AND oy=cy THEN xs=2:ys=4 ELSE PROCcursor(ox,oy):PROCcursor(cx,cy):PRINTTAB(47,1);"     ,     "TAB(47,1);cx;TAB(52,1);cy;
  650 UNTIL INKEY(-74)
  660 PROCcursor(cx,cy):PROCblip
  670 IF cx<952 THEN PROCwindow(1) ELSE PROCwindow(2)
  680 CLS
  690 ENDPROC
  700 :
  710 DEF PROCcursor(x%,y%)
  720 MOVE x%-32,y%:PLOT 2,64,0
  730 PLOT 0,-32,-32:PLOT 2,0,64
  740 ENDPROC
  750 :
  760 DEF PROCsave
  770 f$=FNinputstr("FILENAME ",12)
  780 PROCoscli("*SAVE """+f$+""" FFFF3000+4B00")
  790 ENDPROC
  800 :
  810 DEF PROCload
  820 f$=FNinputstr("FILENAME ",12)
  830 PROCoscli("*LOAD """+f$+""" FFFF3000")
  840 ENDPROC
  850 :
  860 DEF PROCoscli(a$)
  870 X%=osblock:Y%=osblock DIV 256
  880 $osblock=a$:CALL &FFF7
  890 ENDPROC
  900 :
  910 DEF PROCdump
  920 CLS:VDU 26
  930 REM Insert screen dump call here
  940 PROCwindow(0):PROCwindow(3)
  950 ENDPROC
  960 :
```

Continued ▶

◀ The DataPlt program continued

```
 970 DEF PROClabel
 980 IF FNget("Select text or line draw
ing (T/L) :","TL")="L" PROCline:ENDPROC
 990 PROCmovecursor:PROCcursor(cx,cy)
 1000 cur$=FNget("Print text FROM cursor
 (F), or CENTRE text at cursor (C) ?","F
C")
 1010 M%=VAL(FNget("Select label mode: 1
) Background deleted 2) Background retai
ned 3) Underlining","123"))
 1020 a$=FNinputstr("Enter label",60)
 1030 L%=LEN(a$)
 1040 PROCcursor(cx,cy)
 1050 IF cur$="F" MOVE cx,cy+32 ELSE MOV
E cx-16*(L%/2),cy+32
 1060 VDU 5
 1070 IF M%=1 PRINT STRING$(L%,CHR$(9))+
STRING$(L%,CHR$(127));
 1080 PRINT a$;
 1090 IF M%=3 THEN PLOT 0,0,-4:PRINT STR
ING$(L%,CHR$(8))+STRING$(L%,"_")
 1100 VDU 4
 1110 ENDPROC
 1120 :
 1130 DEF FNget(mess$,in$)
 1140 PROCcursoron
 1150 PROCmessage
 1160 *FX 15,1
 1170 REPEAT
 1180 K%=GET
 1190 IF K%>96 AND K%<123 K%=K% AND &DF
 1200 IF K%>32 AND K%<42 K%=K% OR &10
 1210 an$=CHR$(K%)
 1220 UNTIL FNinstr(in$,an$)
 1230 CLS:PROCcursoroff:PROCblip
 1240 =an$
 1250 :
 1260 DEF FNinput(mess$,low,high)
 1270 PROCcursoron
 1280 PROCmessage
 1290 *FX 15,1
 1300 INPUT,value
 1310 IF value<low OR value>high THEN VD
U 7:GOTO 1280
 1320 CLS:PROCcursoroff:PROCblip
 1330 =value
 1340 :
 1350 DEF FNinputstr(mess$,len)
 1360 PROCcursoron
 1370 PROCmessage:PRINT
 1380 *FX 15,1
 1390 INPUTLINE TAB(40-len/2),an$
 1400 IF LEN(an$)>len THEN VDU 7:GOTO 13
70
 1410 CLS:PROCcursoroff:PROCblip
 1420 =an$
 1430 :
 1440 DEF PROCmessage
 1450 CLS
 1460 PRINTTAB(40-LEN(mess$)/2);mess$;
 1470 ENDPROC
 1480 :
 1490 DEF PROCcursoron
 1500 VDU 23;11,255;0;0;0
 1510 ENDPROC
 1520 :
 1530 DEF PROCcursoroff
 1540 VDU 23;11,0;0;0;0
 1550 ENDPROC
 1560 :
 1570 DEF FNinstr(a$,b$)
 1580 IF LEN(a$)<LEN(b$) THEN =0
 1590 =INSTR(a$,b$)
 1600 :
 1610 DEF PROCline
 1620 PROCmovecursor
 1630 x=cx:y=cy
 1640 PROCmovecursor
 1650 PROCdraw(x,y,cx,cy)
 1660 ENDPROC
 1670 :
 1680 DEF PROCblip
 1690 SOUND 1,-10,200,4
 1700 *FX 21,0
 1710 ENDPROC
 1720 :
 1730 DEF PROCdraw(x,y,x1,y1)
 1740 MOVE x-1,y:DRAW x1-1,y1
 1750 MOVE x+1,y:DRAW x1+1,y1
 1760 ENDPROC
 1770 :
 1780 DEF PROCredefine(C%)
 1790 VDU 23,plotchar
 1800 IF C%=1 VDU 255,195,219,195,255
 1810 IF C%=2 VDU 0,126,126,126,0
 1820 IF C%=3 VDU 24,24,255,24,24
 1830 IF C%=4 VDU 195,126,24,126,195
 1840 IF C%=5 VDU 126,195,219,195,126
 1850 VDU 0,0,0
 1860 ENDPROC
 1870 :
 1880 DEF PROCkey(k$,P%)
 1890 PROCwindow(2)
 1900 x=968:y=920-80*P%
 1910 PROCdraw(x,y,x+48,y)
 1920 PROCplotpoint(x+24,y)
 1930 PROCdrawlabel
 1940 PROCwindow(1)
 1950 ENDPROC
 1960 :
 1970 DEF PROCdrawlabel
 1980 VDU 5
 1990 MOVE 1024,934-80*P%
 2000 IF LEN(k$)<16 THEN PRINT k$:VDU4:E
NDPROC
 2010 IF FNinstr(LEFT$(k$,15)," ")=FALSE
 THEN VDU4:ENDPROC
 2020 L%=16:REPEAT:L%=L%-1:UNTIL MID$(k$
,L%,1)=" "
 2030 PLOT 0,0,16:PRINT LEFT$(k$,L%-1)+S
TRING$(L%-1,CHR$(8))+CHR$(10)+RIGHT$(k$,
LEN(k$)-L%)
 2040 VDU 4
 2050 ENDPROC
 2060 :
 2070 DEF PROCplotdata
 2080 plotchar=35
 2090 PROCwindow(2):CLG
 2100 PROCwindow(1):CLG
 2110 ymin=FNinput("Minimum value for ve
rtical axis ",-9E8,9E8)
 2120 ymax=FNinput("Maximum value for ve
rtical axis (ie. maximum data value) ",y
min,9E8)
 2130 yint=FNinput("Size of steps to be
marked on vertical axis ",(ymax-ymin)/20
,ymax-ymin)
 2140 sets=FNinput("How many sets of dat
a are to be plotted (1-5) ",1,5)
 2150 points=FNinput("How many data poin
ts in each set  (1-40) ",1,40)
 2160 PROCdrawaxes
 2170 FOR S%=1 TO sets
 2180 label$=FNinputstr("Title for data
set "+STR$(S%)+" (max 25 letters) ",25)
 2190 PROCredefine(S%)
 2200 PROCkey(label$,S%)
 2210 FOR P%=1 TO points
 2220 data=FNinput("DATA for point "+STR
$(P%)+" ",ymin,ymax)
 2230 PROCplot(FNxc(P%),FNyc(data))
 2240 NEXT P%
```

Continued ▶

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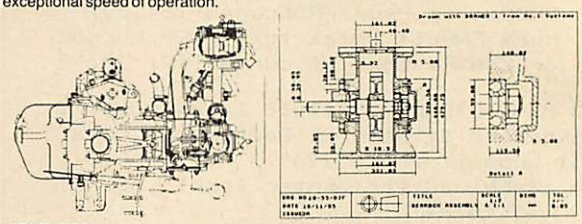
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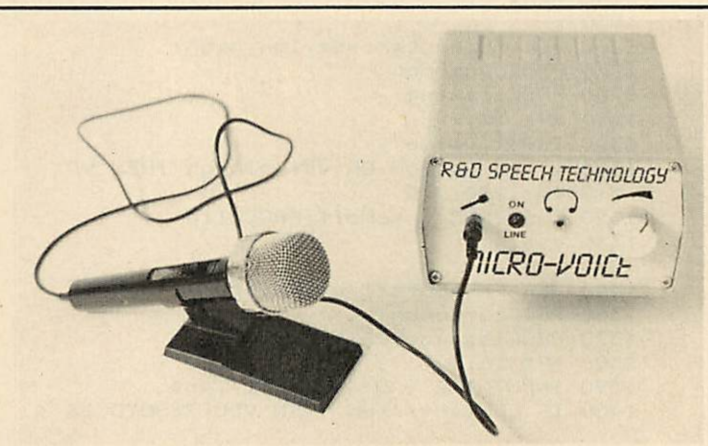
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**◄ The DataPlt program continued**

```
2250 NEXT S%
2260 ENDPROC
2270 :
2280 DEF PROCplot(x,y)
2290 PROCplotpoint(x,y)
2300 IF P%>1 PROCplotline
2310 lastx=x:lasty=y
2320 ENDPROC
2330 :
2340 DEF PROCplotpoint(x,y)
2350 VDU 5
2360 MOVE x+16,y+16:VDU 127,127
2370 MOVE x-8,y+8
2380 PRINT CHR$(plotchar)
2390 VDU 4
2400 ENDPROC
2410 :
2420 DEF PROCplotline
2430 x1=x-lastx:y1=y-lasty
2440 xd=15*x1/SQR(x1^2+y1^2)
2450 yd=15*y1/SQR(x1^2+y1^2)
2460 PROCdraw(lastx+xd,lasty+yd,x-xd,y-
yd)
2470 ENDPROC
2480 :
2490 DEF FNxc(P%)
2500 =200+xscale*(P%-1)
2510 :
2520 DEF FNyc(val)
2530 =xaxis+(val+ydisp)*yscale
2540 :
2550 DEF FNexp(N)
2560 LOCAL @%
2570 @%=&1010209
2580 a$=STR$(N)
2590 =VAL(RIGHT$(a$,LEN(a$)-INSTR(a$,"E
")))
2600 :
2610 DEF PROCdrawaxes
2620 LOCAL @%
2630 xscale=700/(points-1)
2640 yscale=600/(ymax-ymin)
2650 yaxis=180
2660 xaxis=200-yscale*ymin:ydisp=0
2670 IF ymin>0 xaxis=200:ydisp=-ymin
2680 IF ymax<0 xaxis=800:ydisp=-ymax
2690 PROCdraw(yaxis,800,yaxis,200)
2700 PROCdraw(180,xaxis,920,xaxis)
2710 VDU 5
2720 exp=FNexp(yint)
2730 IF exp<0 @%=&1020009-&100*exp ELSE
@%=&1000009
2740 FOR P%=1 TO points
2750 x=FNxc(P%)
2760 PROCdraw(x,xaxis-8,x,xaxis+8)
2770 NEXT
2780 FOR val=ymin TO ymax STEP yint
2790 y=FNyc(val)
2800 a$=STR$(val)
2810 MOVE 164-16*LEN(a$),y+16
2820 PRINT a$
2830 PROCdraw(yaxis-8,y,yaxis+8,y)
2840 FOR X%=180 TO 920 STEP 24
2850 PLOT 69,X%,y
2860 NEXT X%
2870 NEXT val
2880 VDU 4
2890 ENDPROC
```

# EDUCATION

## NEWS

## Working with Information Technology

*by Nick Evans*

*Information Technology at Work* by Dick Davies (Heinemann) is a book which covers the subject sensibly.

Information technology awareness is a topic many schools attempt to address through general awareness courses. However, these often lead nowhere. Courses fail for a variety of reasons, often pupils are already aware, or the course has no firm objective. Occassionally, the course is cobbled together by the already overstretched computer studies department and there is a lack of suitable materials aimed at the right level plus the course content tends to be male-orientated.

*Information Technology at Work* solves many of these problems. It is targetted directly towards the Certificate of Pre-Vocational Education. Routes linked to CPVE requirements are defined in the teacher's guide to enable course material to be selected and structured in a relevant fashion. The whole course is activity-based and is related to familiar every-day settings wherever possible. Paper-based and practical tasks are provided with accompanying information panels and case studies. Moreover, a selection of general resources are listed which will expand the course's usefulness.

This well-presented and carefully structured course provides material relevant not only for the CPVE requirements but also to general awareness courses further down the school. Its modular nature will allow the teacher to pick and mix whatever is needed, after concentrating on the central core of fundamental information technology information.

*Information Technology at Work* costs £4.25 per copy and the Tutor Pack, including detailed tutor's notes, £4.95 from Heineman, 22 Bedford Square, London WC1B 3HH.

## Wordpower foreign alphabets

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Ian Copestake's *Wordpower* wordprocessor has found a footing in a number of local education authorities and press reviews of it have been most favourable. When used with a Master series computer, *Wordpower* can not only print special characters on paper but show them on the screen as well.

This means the program has become a true modern language wordprocessor along with predecessors such as *BBtype* from Furey Enterprises and also the various versions of *Folio* produced by Tedimen Software.

*Wordpower* now has direct mail-merge capabilities with a range of database systems, FIND (Resource), INFORM (Notts. Education), QUEST (AUCBE), *SupaStore* (ESM), *System Delta* (Minerva) and *ViewStore* (Acornsoft). *Wordpower* will operate with *Spellcheck* and with *Spellmaster* and provides right-justified proportional printing in mixed fonts using *Multi Font NTQ* from PMS.

*Wordpower* now supports extra characters for foreign languages. These characters can be displayed on screen and can be printed using an Epson compatible dot matrix printer. Things such as French accents, German umlauts and Russian characters are included among many others.

These facilities make it an attractive buy for a range of subject areas.

*Wordpower* is available from Ian Copestake Software at a cost of £39.50, from Connaught Crescent, Brookwood, Woking, Surrey GU24 0AN. Tel: (04867) 4755.

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**Top and above: the tremendous range of characters**

## Decisions Decisions

*Gridmap* from Shannon Software is a tool to aid decision-making. Teachers as well as careers and vocational guidance counsellors will be able to utilise it to assist students in terms of deciding on careers, subjects for study and related topics.

It works by allowing the individual to rate their opinions of the particular aspects of elements making up a decision. All these opinions are then mapped onto a grid and the ratings are collected together and undergo cluster analysis. The results enable the user to determine the percentage match between elements of the problem and thereby to come to a meaningful decision.

Although this tool is not one to be handled by the untrained, its use as a decision-making utility also makes it an interesting study.

*Gridmap* costs £50.00 from Shannon Software, 15 Avilla, Castleroy, Limerick, Ireland.

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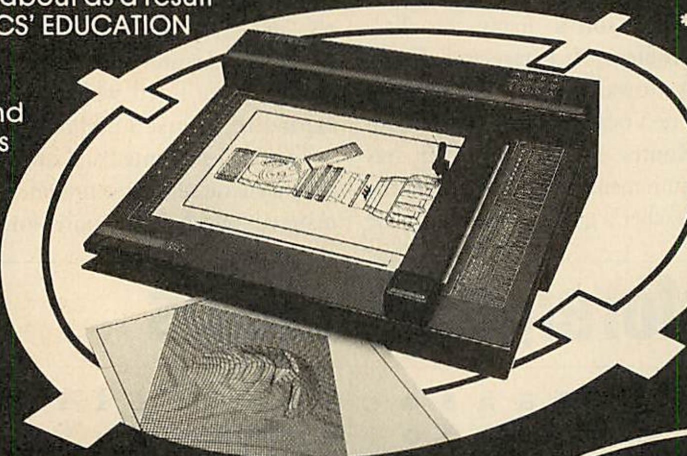
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# Profiling utility

The *General Purpose Profiling Package* from N Haines Software provides a profiling utility to allow a description of the skills, experience and attributes of a particular student to be held in an encoded form on a data-file. The code may then be translated into a full description of the student's profile which acts as a summary to be used by prospective employers.

This computerised report utility will save teachers time in producing reports by assigning a number to each relevant comment. It allows constantly updateable profiles to be held on up to 150 students at any one time. The content of each of these profiles is easily edited and the package protects against alteration.

This package will be of use to careers counsellors, pastoral heads and all teachers and social workers who need to make profiles of individuals.

N Haines Software. Tel: (0705) 467400.

# Keyboard skills

A book to help BBC micro owners to use their keyboard to the full, has been published by the City of London Polytechnic. *Keyboarding in the Fast Lane* is intended for those who cannot attend a full time training course. The book covers wordprocessing and sub-editing as well as basic keyboard skills. A short course to accompany the book is planned at the Poly. The book costs £4.95 from City of London Polytechnic, Calcutta House, Old Castle Street, London E1 7NT. Tel: 01-283 1030.

# Integrated package from LTS

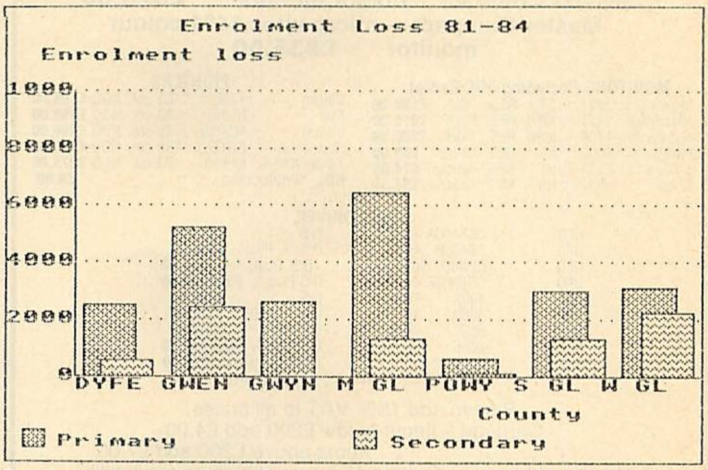
LTS, producer of *Macemail* and *Last Adventure* has made a coup in integrated packages for the BBC micro.

*Desktop* is a fully integrated wordprocessor, database, spreadsheet, graphics and telecommunications package. Each part can pass data to another without any modification.

The package may be used either on a stand alone BBC micro or on Econet. Although other packages have come close to this type of integration, none at this level have ever really succeeded. *Desktop* is an ideal medium for Computer Studies, Information Technology courses and business studies.

The package was developed in Australia and until now the flow of software has been from Britain to the Antipodes. Perhaps the tide is about to turn with such a sophisticated package as *Desktop*.

*Desktop* retails at £94.95 for disc and is available from LTS, Haydon House, Alcester Road, Studley, B80 7AN.




**Graphs such as this from *Desktop* can be incorporated in text**

# Painting more than a picture

BBC Soft continues its range of excellent, high quality software with the *Picture Craft* graphics package. This suite of programs is compatible with BBC B, B+, Master and Compact computers and comes complete with a 120 page booklet. The volume contains not only the method of use but also ideas for development work around the software both at home and in the school.

Graphics packages tend to leave the user with a blank screen and a flashing cursor, waiting for the artistic muse. *Picture Craft* however, fills the void between the child's imagination and the computer's capabilities. Peter Smith, the author has provided the child with the ability to integrate the work created into a puzzle or game. The games of Swaps and Twists and Sliding Blocks may be used in addition to the multitude of ideas for using the resulting printed picture away from the computer.

Mathematical topics such as symmetry, tessellation and the discovery of the attributes of shapes have all been written into this package.

As there is such a variety of facilities available with this software, the author has allowed the parent or teacher to have control. Thus, the software may be tailored to the needs and abilities of a very wide range of users.

*Picture Craft* retails at £19.95 from BBC Soft, 35, Marylebone High Street, London W1M 4AA. Tel: 01-580 5577.

**EDUCATION TOP FIVE**

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|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Answer Back Junior | Kosmos | £9.95 | £10.95 (5.25in) £12.95 (3.5in) | — | Yes | Yes | Yes | — | — |
| 2 | Count With Oliver | Mirrorsoft | £7.95 | £10.95 | — | Yes | Yes | — | — | — |
| 3 | Astronomy | BBC | £9.20 | £13.80 | — | — | Yes | Yes | — | Yes |
| 4 | German Master B | Kosmos | £8.95 | £9.95 | — | Yes | Yes | Yes | — | Yes |
| 5 | Word Games with the Mr Men | Mirrorsoft | £9.95 | £12.95 | — | Yes | Yes | — | — | — |

Compiled by Gallop/MicroScope. Publishers: Kosmos Software, 1 Pilgrims Close, Harlington, Dunstable, Beds LU5 6LY; Mirrorsoft, Maxwell House, 74 Worship Street, London EC2A 2EN; BBC Publications, 35 Marylebone High Street, London W1M 4AA.

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**DESCRIPTIVE STATISTICS:** Analysis of raw data or data with freq counts. Raw data sorted and grouped. Freq dist with choice of lower bounds and class intervals. Absolute, cumulative and relative freq. Histograms, scatter diagrams and time series plots. Output includes sum, mean, mean deviation, median, variance, std deviation, third and fourth moments, skewness, kurtosis, range, etc.

**ANALYSIS OF VARIANCE:** One-way with and without repeated measures, two-way with no interaction, two-way and three-way with one, two and without repeated measures.

**TABULATIONS:** CROSS-TABLUATION: Two-way tables with col and row totals and percentages. CHI-SQUARE CONTINGENCY TABLE: Observed freq, exp freq and chi-sqr for each cell. Col and row sums, overall chi-square stat and its significance level. Yates correction.

**HIGH RES PLOTS:** All plots can be dumped on the printer. PLOT OF BIVARIATE REGRESSION: Scatter diagrams with optional line of best fit, intercept, slope, R2, std error. CURVE FITTING: Fitting of polynomials on bivariate data. Fitted polynomial coeff, R2 and std error. TIME SERIES PLOTS: Simultaneous plotting of up to 7 columns of data against time. PLOT OF FUNCTIONS: Simultaneous plotting of up to two functions, integrals, polynomials and roots of polynomials.

**DEFAULT SETTINGS (For BBC version):** Choice of screen and device control parameters. 40 or 80 column display, number of data drive 0/1/2/3, black & white or colour monitor width of printer, high-res screen dump command, maximum formula length, maximum number of columns and rows depending on free RAM.

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Written by Dr D. Sprevak

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## CPA Critical Path Analysis

Written by Dr J. S. Dean

A comprehensive coverage of critical path analysis sufficient for most practical applications. Activities and durations are supplied as input and earliest and latest start and finish times for each activity, total float and critical path are obtained as output. Easy editing of inputs provides the possibility of analysing the sensitivity of solutions. A built-in calendar can give dates to any programme. Resources can be allocated to each activity. Suitable smoothing scheme is chosen and a resource bar chart is drawn. Results can be directed to printer or to text files. High-res plot of the node structure can be dumped on printer.

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# LINGUISTIC PROCESSING

**Communicating with a computer can provide useful exercises in language development.**

*Chris Drage and Nick Evans*

Language development is a cross-curricular process in both primary and secondary education. It plays its part in English language teaching, in all subjects involving written and oral work, and in the teaching and development of modern languages.

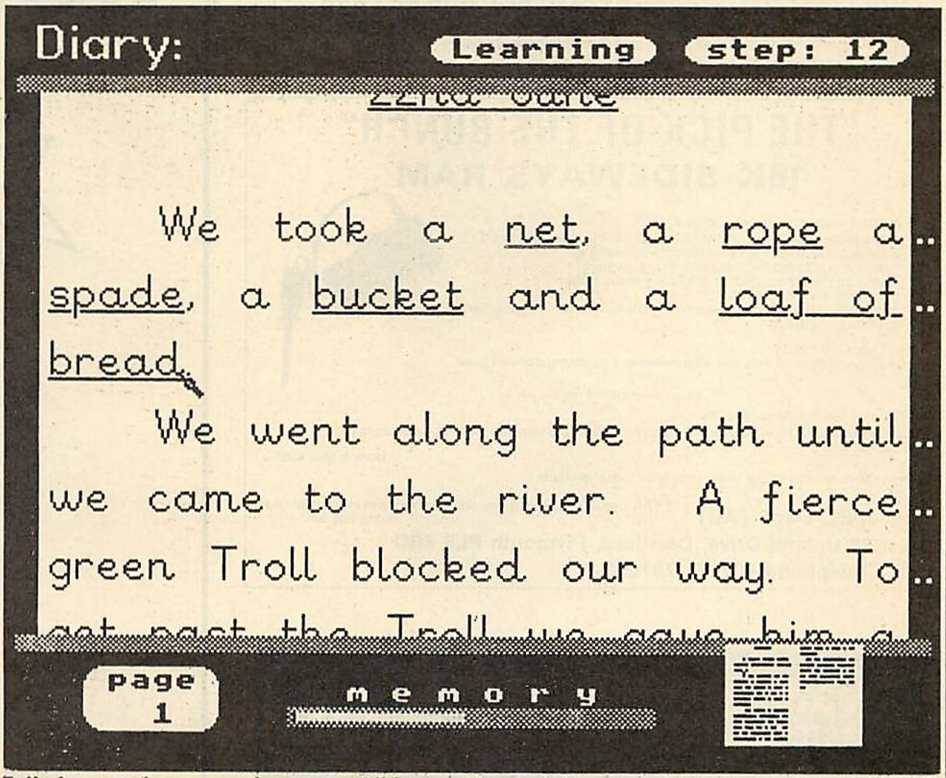
In considering the use of the computer in the classroom, the issues of language development are thrown into sharp relief, since much of the work engendered through the computer depends upon the interactions of groups, the communication between human and computer, the understanding of instructions, and the phrasing of questions, hypotheses and solutions to problems. In this article, we examine some aspects of the specifically linguistic use of the computer.

## Primary possibilities

Traditionally, language work in the primary school has been not so much a curriculum area, more a medium of expression which pervades all aspects of school life. The classroom micro contributes to language development by stimulating discussion and logical thought in group problem-solving. Wordprocessing, Logo, simulations and adventure programs provide four important areas of use. This month we take a close look at some popular programs which encourage children to use a variety of written and spoken skills and offer some suggestions for use in the classroom.

In the early days of educational computing, drill and practice programs flooded the market. Few of these did anything which could not be equally well done by other means. Many tested language skills like spelling, punctuation or meanings of words. They proliferated because they were so easy to write. However, it is much more difficult to write programs which will accept all correct answers and reject all incorrect ones in the complex domain of a natural language.

A typical example of this 'bad' software is the *Brickup* program which was distributed with your original DTI subsidised computer as part of the Micro Primer series. In response to a prompt like, 'something to do with teeth' (beginning with




Folio is a wordprocessor for young children, with special large and easy to read text

'DEN . . .'), the program accepts 'DENTAL' but not 'DENTIST', which is the natural response from the child. It then comes up with the message, 'DENTIST is spelt badly', simply because it was not the word that the programmer expected. At best this type of software can only test rather than teach and most do so outside any meaningful context. At worst, some will even fail to accept perfectly valid answers and penalise children for their ingenuity and unorthodox answers.

## Better beginnings

However, some early software gave children the opportunity to construct their own electronic workcards from which a good deal of userful language work could arise. *MQuiz* and *Quiz* were two such programs, which allowed children to create and solve their own multi-choice tests on any subject. As with *Brickup*, many of the children's efforts will fail to acknowledge valid answers, and some will surely contain false information. I have found that the most valuable experience is the process of creating the quiz. As children have created the quizzes for themselves, they can be led to an appreciation of the complexity of language. Perhaps the best of the genre is *Answer Back Junior* from Kosmos.

Another potentially useful program is *Mallory*, the electronic version of Cluedo, (a package which has the added advantage of being copyright free). It is a program which stimulates a good deal of purposeful discussion and logical thinking – and children love it. For teachers familiar with a little Basic it is well worth adapting *Mallory* to new scenarios by altering the data statements in the program. You can redefine the setting with its 25 rooms, the number and names of the characters who stay there, and the number and names of items which get stolen. Why not try your own school as a starting point then move to other scenarios according to the children's environment? It could even be set in an Egyptian burial site, or on a spacecraft or a distant planet.

Planning and researching the new scenario, describing the rooms, considering

the characters involved, writing character studies about them and acting their parts, all add a further dimension to the normal work at the computer. All these possibilities from price free software available through your LEA computing centre!

## Content free

A generative program like *Developing Tray* from Capital Region is a content-free program which can be used right across the curriculum. Passages are presented as a series of dashes or with some of the letters filled in. Children may then try to guess missing letters or have them provided by 'buying' them from the computer. A scratch-pad facility is provided to help children make sensible guesses and predictions. It pinpoints the structure and grammar of language because little graphical information is given. Children really do have to use semantic, syntatic and stylistic clues in order to complete a piece of text. It is especially valuable as a small group activity. However, in my experience it is often useful for the program to be introduced as a class activity, so that all the children become familiar with the program and the rules which apply, before they use it in small groups.

I have also found the optimum group size to be three or four children. Fewer than that, and constructive argument and discussion suffer; more than that, and there is a tendency for individual children to sit back and leave it to others.

Another important aspect of using *Developing Tray* successfully (especially with younger children) is to encourage them to be bold in making guesses and predictions. There is nothing to lose in this approach and everything to gain; children may demonstrate considerable orginality of thought and language. Another important aspect of this group activity is to show that everyone with an opinion to express deserves a hearing. Encourage the attitude that a group should continue only after a consensus has been reached. If at any time enthusiasm is generated for children's own writing, then capitalise on it. *Tray* is a good stimulus for discussion and imagination. At first it may be necessary to make the tests rather simple and familiar, to encourage success and motivation especially with younger children.

It is important to vary the content, styles and form of the text used. Poetry and stories from reading schemes are obvious choices, but why not try shopping lists, advertisements and posters. Each has a different quality to offer. Children's own written work provides a wealth of material, most which is thoroughly enjoyed by other class members. Your education authority should have a copy of the MEP Language Pack, which contains a wealth of ideas on how to use this most valuable piece of educational software.



**Pendown: simple but with good utilities**

Wordprocessors provide a unique system of 'putting down thoughts'. Logotron's powerful *Pendown* package and Tedimen Software's child-centred *Folio* were two excellent wordprocessors reviewed in the October '86 issue of *Acorn User*. Here are some ideas for classroom use with these powerful writing tools.

Try writing group stories. These can be illustrated later and displayed or made into a book. Stories can be carried on from some starting point provided by the teacher or other children. This type of activity leads naturally to the production of a class newspaper or magazine – especially helpful are *Pendown's* various fonts and printing styles. Creating posters to advertise forthcoming events in the school is another popular activity.

Letter-writing provides another possibility. My children are currently writing to their pen-friends in Australia and enjoying the experience immensely. Another enjoyable activity is to write a story about someone called 'Z'. Other children can then load the story and use the replace command to substitute another name of their choice. The story can achieve some remarkably different meanings. Other wordprocessing skills may be practised by, for example, using the block move facility to jumble up a short story, leaving the children to unjumble it. Similarly, sequencing tasks can be set. Search and replace can be used to change some words to produce coded messages for friends to decipher. The range of activities is limited only by the imagination.

However good, wordprocessors will never replace the pencil and paper, nor will adventure programs provide the warmth and feeling generated through story-telling. Computer programs will never replace concrete experience, but used selectively, the computer can stimulate and promote a range opportunities for thinking, talking and writing which will greatly enhance the language development programme in the primary school.

## Secondary suggestions

Much of what has already been said in the primary area can been transferred directly to the secondary classroom. *Developing Tray* has, for example, be successfully used in English, modern languages and humanities. It is a program which is sufficiently open-ended for the teacher to be able to use his or her ingenuity on it to bring about a particular result. The secret of any such program is to experiment.

Another freely available package that has seen much success in secondary schools is *Extra, Newsroom Simulation.* The history behind this package is quite interesting. It was developed in Shropshire by a teacher who took a party of children to a newspaper office as news of the Hyde Park Bombing by the IRA was coming over the teletype. These agency reports and the manner of their delivery fascinated both children and teacher. The fact that so much that was irrelevant, confused or simply wrong was interspersed amongst fact provoked the idea in the teacher's mind that here was an example of language use and understanding that is hard to beat.

Consequently he decided to simulate the newsroom experience by providing a teletype output from the computer that could be used in the classroom. This simple idea grew into *Extra, Newsroom Simulation.* If you provide four printed copies of the output, and provide a timer to stagger the times of each bulletin, then a true simulation can be built up. Groups of children writing newspapers with *Fleet Street Editor* or *Pagemaker,* others producing teletext screens for a local viewdata system, others concocting news broadcasts for Radios One, Two, Three and Four, or television bulletins of varying length, all provide the class with exercises in constraining language to fit certain circumstances. The computer is not *doing* the language work, it is initiating and stimulating it.

The *Newsroom* package has been available for some time on Prestel, but failing that you should rush round to your local Computer Education Centre with a blank

disc and get a copy. It comes complete with the 'Bomb' datafile which is the actual events that were put over the news agency 'wire' on that day. A simple editor allows you to create you own files to suit your purpose in English, history, drama or any other area which seems appropriate.

## Wordprocessors again

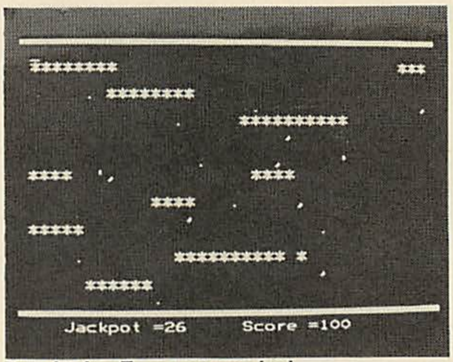
As regards wordprocessors in secondary schools the same principles apply as in primary education, except that the diversity of subjects and the disposition of their associated rooms means that the easy availability of a machine is unlikely in most circumstances. Yet it is true to say that most language departments, both mother tongue and foreign, would benefit from a wordprocessor available for use somewhere in the faculty.

English language teachers will have their own preferences in wordprocessors, ranging from *Edword* to *Wordwise +*, *View* to *InterWord*, not to mention *Wordpower*, *Folio*, *Pendown*, *Prompt 3*, *ABC*, *Wordplay* and all the other packages all with their own peculiarities and strengths. Ask a *Wordwise* owner which is the best wordprocessor and he'll tell you. So will a *View* owner, and a *Wordpower* owner. Users 'grow into' their packages, with which they build a special relationship. Converting users to a new package is very tricky and for that reason one observes LEAs going overboard on saturation coverage of one single package when variety may actually be more appropriate.

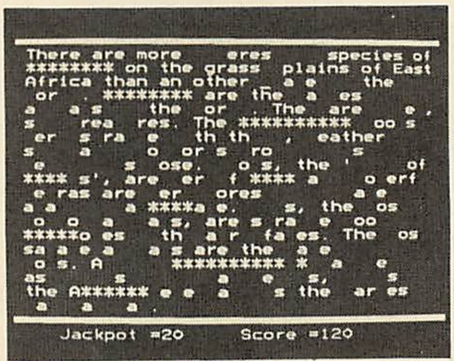
## For languages

Modern languages' use of wordprocessors and, for that matter, of many other software applications, has many associated problems. Whereas English users are quite happy with a teletext character set in mode 7, modern linguists will throw up their hands in horror – no accents! Indeed, if you progress to Scandinavian or Slavonic languages, it is not merely a matter of accented characters but entirely new characters – replacement alphabets. If, as an enterprising modern languages teacher with a modicum of programming skill, you modify a program to work with additional accented characters the 'No room' and 'Bad mode' messages will dog your footsteps. In order to create these characters it is necessary to enter a mode which gobbles up memory with alarming speed.

A wordprocessor with accented characters must also fulfil two conditions. Not only should it be able to show them on




**Developing Tray: use any text. . .**




**which groups of pupils fill in**

screen but also be able to send them to the printer as well. At this point the limitations of the printer become the main issue. Epson compatible printers will generally be capable of supporting the additional characters you define for a limited part of Europe. Beyond that, you are in the realm of screen-dumps for output as performed for example by *Folio*. This package in fact is available in a multitude of versions including Hindi, Gujarati, French, German and so on (see *AU* Education News, May 1986). The clarity of its presentation and ease of use make it well worthwhile in the modern languages classroom.

If you feel that you need a greater variety of character sets than this package provides, it is worth mentioning a little-known company which produces a competent and extensive multi-character set wordprocessor. Furey Enterprises became modestly famous for their BBkey function strip holder which tidied up all your messy function strips into one flippable booklet (it's still available). Their *BBtype* package is low cost, £18 to educational users and £23 to all others and comes complete with French, Italian, German, Scandinavian, Spanish, mathematical and technical character sets. It is also possible to purchase additional character sets (£10 each), including Esperanto, phonetics, Attic Greek and Welsh.

If you have a special set you wish to have created then Mr Furey will do the job for only £10 provided you buy *BBtype* as well. This seems a bargain too good to miss for some language specialists. Please note, however, that because the character set is resident only in the function key area of the micro it is limited to only 40 supplementary characters.

*BBtype* is also one of the few wordprocessors that allows you to create vertical lines on paper by using the matrix and integration brackets facility. The package also has a separate utility that may be bought for spooling in text direct from files created in *Wordwise* or *View*. But remember that the memory overheads are such that the document can only be short. An Econet version is available at £30 and the package is fully compatible with the Master and Electron.

A further package with modern languages capabilities is *Wordpower* from Ian Copestake. Its facilities are described in this month's Education News section of *Acorn User*.

The language program is what the teacher makes it. Apart from those drill and practice packages which are designed to drum in particular principles, most language programs are, like wordprocessors, generally content-free or certainly with a very open-ended approach to integration. The limitations are merely those of the teacher's own ingenuity.

Many case studies, available from teachers and computer centres, provide ample evidence of the way in which linguists of all shades can maximise the use of the computer.

*Developing Tray (B, B+, M): £4 from Capital Media, John Ruskin Street, London SE5 OPQ.*

*Extra, Newsroom Simulation (B, B+): free from LEA's.*

*Folio (B, B+, M): £17.25 from Tedimen Software, PO Box 23, Southampton SO0 7BD (education authority licences are available).*

*Pendown (B, B+; M version in preparation): £39 from Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ.*

*BBType (B, B+, E, M): £18/£23 from Furey Enterprises, 7 Manor Park, Froxfield, Wiltshire SN8 3LF.*

*Answer Back Junior Quiz (B): £9.95 (cassette); £10.95 (disc) Kosmos Software, 1 Pilgrims Close, Harlington, Dunstable, Beds LU5 6LX.*

*MQuiz and Quiz, were distributed in the Micro Primer Pack.*

*Mallory is available through your computing centre.*

# ACORN FORUM

**Mike Barwise leads you through readers ideas on soft keys, sideways ROM, secret messages**

£5
## SOFT TOUCH

A nice submission from Sebastian Lazareno of Ware in Hertfordshire. I'll leave it to him to describe what it does and I'd like to say let's have more submissions like this please! See the yellow pages for the actual listing.

Have you ever wanted the use of all 16 soft keys — without disabling cursor editing or pressing Break? After the following program is run, pressing the Copy or cursor keys with Shift will invoke keys 11 to 15, and pressing Tab with Shift invokes key 10.

The routine is located in Page 9. It can be turned off with CTRL+Shift+Copy, and turned on again with CTRL-Copy. The code can be saved with '*SA.FUNC 900 +93' and then run. The Basic program sets up keys 10 to 15 for easy editing.

The effect of pressing Shift plus cursor depends on the cursor editing status (set by *FX4) and the Shift plus soft key status (set by *FX226). The routine inspects each character to be inserted into the keyboard buffer by intercepting the 'insert into buffer' vector. It checks whether cursor-editing and Shift plus soft key is set by the user, and if so stores them. If the character is nine (Tab) is it replaced with the Shift+f10 character. If the character is Shift+f10-f15 the cursor and Shift+soft key status are altered, otherwise the status bytes are restored to the user-defined value. Finally, the routine jumps to the address initially pointed to by the vector.

## LOOKING AT ROMS

Here's an interesting routine from T Blunt of Crowthorne which accesses sideways ROM routines in the BBC micro. I'll let Mr. Blunt take you through it. . .

From time to time you find that a machine code routine you would like to use, already exists in one of your sideways ROMs. While there are many dissassemblers that will let you look at the ROMs, I have not seen one which actually lets you use what you find in situ. I have found a method of doing this very easily, by making the operating system do all the work for you.

The method is to make use of the extended vector system of accessing ROMs. Under normal circumstances their use is quite complex, and the system is really intended for sideways ROMs to do the calling, so that they can link up for file handling. As we are not going to do this, I will only describe the part of their function which conerns us.

The vector we will be using is the 'user' extended vector. This is the safest to play about with, as it is only active on user-supplied routines. It is also the first in the table of vectors which makes the calculations simply. The vector can be found by performing OSBYTE &A8 with X=0 and Y=&FF, the address is returned in X and Y. Alternatively from Basic you can read the address with the 'USR' function as the following shows:

```
A%=&A8:X%=0:Y%=&FF
Vector=(USR&FFF4 AND&FFFFFF) DIV&100
```

In OS 1.2 this will be &D9F. Having found this address (call it V) you must now make it point to the code you want to run (A), in the socket number of the ROM concerned (R). From Basic:

```
?V=(A)AND&FF:V?1=DIV&100:V?2 =(R)
```

All you now need to do is use the operating system's calling routine at &FF00 so a complete Basic program could be written as below. Assume that the routine we want is at &9A00 in socket number 10:

```
10 A%=&A8:X%=0:Y%=&FF
20 V=(USR&FFF4 AND&FFFFFF) DIV&100
30 ?V=0:V?1=&9A:V?2=10
40 CALL &FF00
```

It is a fairly simple matter to devise a program to hunt through the ROMs for the socket number of the one you want using OSRDRM and I think it has already been mentioned in the magazine so I don't think there is any need to repeat this.

I have shown the idea in Basic to demonstrate how easy it is to use, but it is in fact more useful in machine code programs. I have used it in a rather nasty bit of program protection calling parts of the disc filing system and it works well.

£10
## CATALOGUE CAPERS

I've been sent a couple of interesting items which could be good for the hardware-minded among you.

First, is a book catalogue from Bernard Babani. They have been going for ages in electronics projects and have now extended their catalogue to include some compacting titles that look good. Above all they are cheap and the catalogue is free.

Bernard Babini (Publishing) Ltd, The Grampians, Shepherd's Bush Road, London W6 7NF. Tel: 01-603 2581/7296.

The second one is the Cirkit electronics components catalogue. This is quite expensive at £1.20 but well worth it for amateur radio enthusiasts in particular and for anyone looking for test gear or tools.

Cirkit Holdings plc, Park Lane, Broxbourne, Hertfordshire EN10 7NQ. Tel: (0992) 4441111.

£15
## SECRETS SECRETS

David Atherton of BBC fame has sent in an interesting, if purely entertaining idea on reading the secret messages on the BBC micro operating system ROM. It will only work on Master and Compact.

BBC micro owners will remember that a long time ago, much was made in the press of the secret messages in the operating system ROM. These were the names of the contributors to the production of the machine, and a different list appears on each Acorn micro.

The list is secret because it is placed in memory addresses &FC00 to &FEFF. These addresses are paged out, and replaced with I/O hardware. Thus, if you try to read or write the addresses, you get the values of hardware ports, not the ROM.

Changes to the hardware design in the Master 128 and Compact allow the user to read this section of ROM by running the following program from David Atherton. The program reselects the ROM at these addresses, copies the text into RAM and then prints it. If you have a Master with a MOS 3.21 or higher, you'll find that the

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name list in MOS 3.21 has been replaced with some machine code.

The nicest thing about this listing is that he is using (for the first time in anything sent to Forum), the extended OP code set available on the CMOS 6502 processor. Nice one squirrel. Why doesn't someone else give it a go?

```
   10 REM Acorn OS credits
   20 REM by David Atherton
   30 REM for Master 128/Compact
   40 REM (c) Acorn User January 1987
   50 :
   60 HIMEM=&2000
   70 DIM M% &100
   80 acccon=&FE34:oswrch=&FFEE
   90 FOR pass=0 TO 3 STEP 3
  100 P%=M%
  110 [OPT pass
  120 SEI
  130 LDA #&FC
  140 STA &71
  150 STZ &70
  160 LDA #&20
  170 STA &73
  180 STZ &72
  190 LDA acccon
  200 PHA
  210 LDA #&40
  220 TSB acccon
  230 .loop
  240 LDA (&70)
  250 STA (&72)
  260 INC &72
  270 INC &70
  280 BNE loop
  290 INC &73
  300 INC &71
  310 LDA &71
  320 INC A
  330 BNE loop
  340 PLA
  350 STA acccon
  360 CLI
  370 LDA #&20
  380 STA &73
  390 .loop2
  400 LDA (&72)
  410 JSR oswrch
  420 INC &72
  430 BNE loop2
  440 INC &73
  450 LDA &73
  460 CMP #&23
  470 BNE loop2
  480 RTS
  490 ]
  500 NEXT
  510 CALL M%
```

## SIMULATING ASSEMBLER

Chris Dunley has submitted a rather neat method of simulating the Basic 2 assembler functions EQUB, EQUW, EQUD and EQUS when using Basic 1.

He does this with the aid of a small piece of machine-code which is stored at &900. Listing 3 on the yellow pages assembles the code and includes a checksum to help you spot typing errors. The routine is for use with Basic 1 only and calls the Basic ROM extensively.

## WHICH MACHINE?

It is often useful to find out which type of machine a particular program is being run on. David Lawton points out a simple method of obtaining this information using the Basic function INKEY. If you type:

PRINT INKEY (−256)

you will be presented with a number, unique to the type of machine you are using. For examples, the value will be 0 on a standard BBC B, but if you have a Master Compact, the figure 245 will be displayed. Listing 6 (below) uses this feature to identify and print the name of your machine. The table below contains a summary of the values obtained.

```
   10 REM Machine Identifier
   20 REM by David Lawton
   30 REM for BBC B/B+/M/C/E
   40 REM (c) Acorn User January 1987
   50 :
   60 MODE 6
   70 PRINT"You have ";
   80 K%=INKEY(-256)
   90 IF K%=0 PRINT"a BBC with OS 0.1"
  100 IF K%=-1 PRINT"a BBC with OS 1.0 or later"
  110 IF K%=1 PRINT"an Electron"
  120 IF K%=253 PRINT"a BBC Master 128"
  130 IF K%=251 PRINT"a BBC B+"
  140 IF K%=245 PRINT"a BBC Master Compact"
  150 IF K%=100 PRINT"a BBC washing machine"
  160 END
```

## MASTER MAGIC

Here's an interesting fact not many Master 128 and Master Compact owners may know. You have an extra command in your computer vocabulary, namely:

*BASIC @

This will take an ASCII Basic file loaded in at PAGE and transform it into a Basic program! For example enter the *View* wordprocessor and type in the following small listing in edit mode:

```
10 MODE 7
20 PRINT "This was an ";
30 PRINT "ASCII file written"
40 PRINT "within View"
50 END
```

Return to command mode and write the file to disc:

WRITE Magic

Now ensure memory is clear (turning your micro off for a few seconds is the quickest way) and *LOAD the file in to PAGE, typically as follows:

* LOAD Magic EOO

Now say the magic word:

*BASIC @

and then LIST. Now that's magic!

*Turn to the yellow page index on page 113 for details of listing 1 from Sebastian Lazareno and listing 3 from Chris Punley. The Acorn Forum listings are on this month's listings' disc.*

| Machine | Value of INKEY(-256) |
|---|---|
| BBC B with OS 0.1 | 0 |
| BBC B with OS > 0.1 | -1 |
| Electron | 1 |
| BBC Master 128 | 253 |
| BBC B+ | 251 |
| BBC Master Compact | 245 |

**Table 1. A summary of the values of PRINT INKEY (−256)**

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| Raid Over Moscow | 9.95 | 7.75 |
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| Beach-Head | 9.95 | 7.50 |
| Trivial Pursuit | 14.95 | 12.95 |
| Lord Of The Rings | 15.95 | 12.95 |
| Repton | 9.95 | 7.50 |
| Repton 2 | 9.95 | 7.50 |
| Speech | 9.95 | 7.50 |
| Citadel | 9.95 | 7.50 |
| Myorem | 9.95 | 7.95 |
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| Galaforce | 11.95 | 10.95 |
| Enthar 7 | 16.95 | 14.95 |
| Project Thesius | 11.95 | 10.45 |
| Speech | 11.95 | 10.45 |
| Exploding Fist | 14.95 | 12.95 |
| Powerplay | 14.95 | 12.95 |
| Citadel | 11.95 | 10.45 |
| Thrust | 11.95 | 10.45 |
| Scrabble | 14.95 | 12.95 |
| The Hobbit | 17.95 | 15.95 |
| Lord Of The Rings | 19.95 | 16.95 |
| Psycastria | 11.95 | 10.95 |
| Sink The Bismark | 10.99 | 9.95 |
| Moon Cresta | 9.95 | 7.50 |
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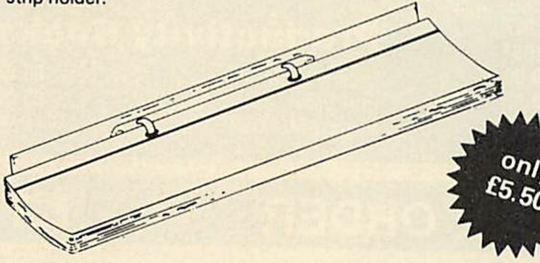
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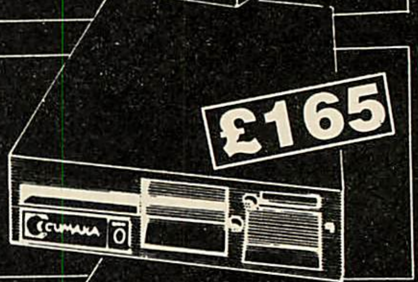
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**Sideways RAM** moulded units, ideal for education. Simple fitting, with R/W protection and **free** disc software. 16k £12.00, 32k £22.50. **User Port Selector**. Expands one into six. LED indicators included £32.00. Ten D/S D/D 96 tpi discs, £10.00. Send cheques to GB Electronics, 67 Bishops Ave, Bromley, Kent, BR1 3ET.

**Disc-ount!** 5.25in DS/DD guaranteed discs. £6.30 for 10, or £12 for factory-sealed pack of 20. Price includes sleeves, labels, postage and VAT (ask for receipt if required). SEE 10 library case £3.50 extra. ICS Supplies (ACU1), 23 Connaught Crescent, Brookwood, Woking, Surrey, GU24 0AN. Tel: (04867) 4755.

**Master Compact/Electron.** We will transfer unprotected discs from 5.25in to 3.5in (or vice versa). Price per disc £2 (ADFS-ADFS) or £4 (DFS-ADFS), plus enough for return postage. Send your own blank discs or add £3 each. ICS (ACU2), 23 Connaught Crescent, Brookwood, Woking, Surrey, GU24 0AN. Tel: (04867) 4755.

**Connectors,** low price, not low quality. BBC printer lead 1.5m, £6.70 including P/P. Send for list: Alpha Communications, 26b Victoria Road, Emsworth, PO10 7NH, Tel: (0243) 375931.

**Numeric keypads** for the BBC B. Guaranteed compatible with all software, 0-9, Decimal & Return, £29.95 inc. P&P. Commercial Products, 11 Hylands Close, Crawley, Sussex, RH10 6RX. Tel: (0293) 30174.

**Video-clip** Flippable disc packed with compressed mode 0 digitised pix of the famous, suitable for cutting and pasting into *Pagemaker* pages. Plus offer of FREE digitised pic of your own. Only £6.30 (state 40/80T), to P Lee, 2 Waddington Terrace, Mexborough S. Yorks S64 9BA.

**Torch Z80** Dual Disc Pack, 2nd processor converts BBC to CP/M machine; complete with software, (database, spreadsheet, word-processor), manuals. As new £300. Phone: 0602-411120.

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**3 inch uncased drives** used but tested, OK. Send £20 to James Yorke Ltd, Corpus Street, Cheltenham Glos GL52 6XH. Also double side, £25.

**Penman I Plotter.** Unused, still boxed! Includes leads, manual, utility disc. Suitable for BBC with drive. £170. 'Tim', 01-560 7310, Hounslow, near Heathrow. Merry Xmas.

**128k B+** Excellent condition, includes *View 3*, *ViewSheet*, *ViewStore*, ADFS & GXR+ ROMS, including support discs & manuals. Sell for £415.00 o.n.o. Tel 061-485 3914 (Manchester Area), evenings/weekends.

**EPROM** erasing and programming service. Very low cost. Send SAE for details: A Smith, 11 St. Clement's Close, Ardsley, Barnsley, South Yorkshire S71 5DD.

**BBC** model B, complete with Torch Z80 twin disc pack. Perfect calc filer, writer software, recently serviced, £499 ono. Tel: 061-832 7700. (office), (0625) 612838 (home).

*Elite* 'backer', makes a backup disc which will run on the Master, and backups of other software, £4 inclusive, 29 High Street, Warmley, Bristol, Tel: (0272) 600323.

**Second** sight! Amaze yourself and friends, with the first computer fortune teller. 5.25in, 40/80 reversible disc, only £9.95. Redwing Borfa, Hafod, Tregynon, Powys SY16 3PZ.

**Printer** utilities 16k ROM for Epson compatible printers. Includes full graphic teletext dump and many other utilities. ROM, £11. ROM image £7.50. R Johnson, 42 Brackyard, Cambridge, CB1 3PQ.

**BBC B,** 1770 DFS; ADFS; PD+ *View 2.1*; *ViewStore*, ADT; Watford 32k, RAM board, ATPL ROM board; Philips Amber monitor 80. Opus DS disc drive; tape recorder; joy stick, 20 discs. Manuals + books with software £680 ono. Ring: Mark (0222 564295)

**OBERON** Omnireader, new, £130, Morley RAMduk, unused, £150, AMX Mouse with *Pagemaker* art software, new, £75, *Wordwise Plus*, £20, Jacques, Tel: (04427) 5702, after 6pm.

**32016** second processor with 4Mb RAM, Basic, Pascal, Fortran, 3200 — Assembler, C, Lisp, (software and manuals), £750 (+ VAT) ono, (unused), Tel: Blackpool (0253) 64209.

**Programmers!** Join the nationwide team that links together some of the best coders in the country. For more details write to: Paul Phillips, 13 Mountain Rd, Conway, North Wales.

**Z80** Acorn second precessor plus software, as new, £150 ono. Also dual 3in disc drives, £75. Phone: 01-542 9401, evenings/weekends, 01-672 6626, days, Patrick Vaughan.

**Upgraded** to disc? Problems transferring your tape software to disc? I'll transfer it for you. Also disc back-ups. Cost third original price. Disc is included. Cheque with software on the original media, state BBC type, DFS type, 40 or 80 track. To BWS, 25 Vauxhall Rd, Newcastle NE6 4YH.

**We must remind advertisers that we cannot carry advertisements which incite readers to break the protection and therefore copyright of commercial software**

**BBC B** +128k £245, dual drives £120, monitor £40, 6502 second processor £95, printer £35, ROMs, books etc. £495 for the lot. Tel: Cheltenham (0242-67) 5247.

**Games** (BBC B, B+, Master, Electron) *Battleships*, *Reversi* (*Othello*), *Space Invaders*, all for £3.99 tape. Cheques to: A E Allcock, 110 Hillview Road, Ensbury Park, Bournemouth.

Problems? try R-SOFT utilities! 1, How-To: An essential collection of software and instructions for frustrated new disc owners who want to move their programs to disc. 3, **Rompull** and **Tapedump.** 4, **Automatic Disc Menu:** Includes sideways-RAM version, can boot from ROM, works with second 6502. 6, **SWROM***: puts your basic/machine code programs in ROM format. 7, **RFS-Generator:** Generates ROMS for the *ROM filing system. This does not use DFS workspace and is an ideal tool to run nasty programs from disc. All above packages £5.00 each. 13, **D-Master-V2:** Superb disc backup program; needs 8271 and swram; £8.00; on 16k eprom: £12.00. Upgrade for D-Master owners: £5.00/£9.00. 16, **Opus SD/DD/Challenger:** Disc-Menu, Disc Editor, Disc Indexer, etc. Please enquire for further details. 17, **D-Editor:** based on D-Master-V2: will edit any disc D-Master-V2 can backup! £8.00/£12.00. Please send sae for full list. R-SOFT, 22 Marriotts Close, Felmersham, Bedford, MK43 7HD (0234-781730)

## SMALL AD SERVICE

Please include your cheque for £11.50 (inc. VAT) made payable to Redwood Publishing (please note: no POs; cheques only). This is the standard fee. Don't forget your name, address and phone number. Send cheque plus form to Acorn User Small Ads, 141-143 Drury Lane, London WC2B 5TF. Please print clearly.

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# ACORN ABUSER'S

## DIARY

### VooSpiel

We hope the compilers of the next edition of the New Oxford Dictionary get on to Acornsoft before they start, because they've invented a really good new word in *VooSpeel*, it's 'nnnnn'. Another good one is 'aa'. Tell your doctor.

Acornsoft leave out other interesting things as well. The ending 'th' as in 5th comes up as wrong and the dictionary does not have any of our editor's favourite words: floccinaucinihilipilification (which he once used to upset an Acorn speech recognition system) and discombobulate (which is what he did to the speech system).

### Over the wall

News comes to us of another defection from the *Acorn User* office. David Acton, technical assistant, lovingly known as 'Actionless', has leapt out into the wide world as a freelance consultant and programmer.

He'll be working on TV prompting equipment – the sort of thing that tells news presenters and politicians when to speak, grunt and nod (we've clubbed together to buy one for him when he's finished it).

Abuser also welcomes two new *Acorn User* inmates, who've been employed to check Bruce Smith's spelling! Paul 'Friesian' Horrell and 'wee' Shona McIsaac.

### Who did it?

A massive response to our 'I did it competition' (11 actually), which was on the October disc. The winner was Mr R Bell of Waltham Abbey in Essex. Mr Bell wins a UserROM for his answer of FIFTY ONE.

## Double-Dutch disaster days

Unknown to the dynamic duo, the Diary team sent ace roving reporter, Orson Fact, on an undercover mission to follow the Quinn-Smith consortium on their recent trip to the Big Ben Club meeting in Holland. They unsuccessfully tried to supress his report. No names have been changed to protect the guilty. Take it away Orson . . .

**Dateline: London, 10.30pm, Thursday 16th October:** Suspects leave office having spent the evening trying to squash 24 yellow page listings into just 16. With Smith still wearing magnifying lens attached to cap, they drive to the Smith household in North London.

**7.30am, Friday:** The suspects leave Smith household in editor's company car, a Robin Turbo GTI, heading west for Harwich. **7.45am:** Suspects now head east for Harwich! **9.00am:** Suspects arrive at Harwich and eat breakfast, a compact cereal upgrade and chips. **10.00am:** Check-in at terminal, boats on strike, no ferry. **11am:** Thomas Crook advise disgruntled suspects to bribe way onto cargo ship. Advice rejected and the duo head for Felixstowe instead. Ship leaves Felixstowe. **1.50pm:** Suspects locate vacant chairs.

**Saturday 18th October, 7.00am:** Suspects escape boat in Zeebrugge. Half an hour later suspects arrive back at port. Quinn overheard saying, 'this time we'll go left'. **8.50am:** Robin Turbo approaches outskirts of Hedel. Luckily, BBC signs and arrows point the way. **9am:** Destination reached, 60 seconds to show time, frantic activity as they remove computers and magazines from car. **9.50am:** New matchsticks inserted into eyes. **10am:** Show time! **11am:** Sold out! **11.01am-5.30pm:** Suspects spend all day watching angry Dutch customers watch them. **6pm:** Suspects pack. **7pm:** Hotel found. The De Weger man turns up bearing gifts. **8pm:** Big Ben Club dinner starts in sophisticated Dutch restaurant. **10pm:** Third course finished, Quinn dozing off. **10.30pm:** Subject Smith excuses himself, snoring sounds heard from little boys room.

**1.30am:** Party leaves restaurant after six-course meal. **7am:** Aching sounds heard. **7.30am:** Subjects leave Den Bosh. **8.45am:** at the ninth service station Smith finds present, Dutch rag doll for daughter, Sarah. **11am:** Subjects sound asleep and heading home. Next year they resolve to take the A1.

**January issue:** Dutch doll finds way onto front cover.

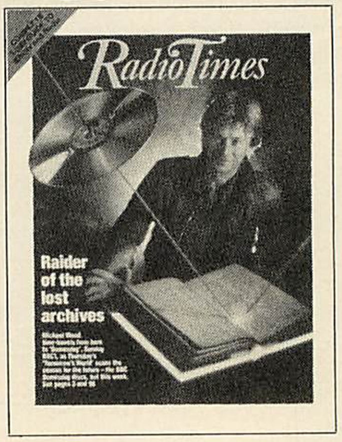
**Next month:** Orson brings you the delights of Quinn's holiday in Morocco.

## No Domesday, no comment

The BBC is catching Acornitis! This little-known disease (it's not in *VooSpeel*) results from company spokespeople being briefed about a product. Once someone is 'briefed' they don't know anything about it.

Our reader rang in to tell us of a conversation with the BBC about the Domesday discs. He had seen last month's Diary flyer on the cost of the BBC's Domesday interactive video disc system at £3800 and wanted to check the price.

An advert for the system appeared in the *Radio Times* (disguised as a front cover)




dated 22–28 November. The cover line read 'out this week'. He rang up on 18 November to be told by the Domesday information people that they couldn't talk about it because it hadn't been launched (in spite of the *Radio Times* plug).

However, he had already been told the price by someone who hadn't been briefed as he was passed around a few BBC departments, 'that's not just a compact disc you know, it costs about £4000', they said.

It just goes to show, when you want to know something, talk to someone who knows, but hasn't been briefed, rather than someone who knows but has been briefed and so doesn't know any more.



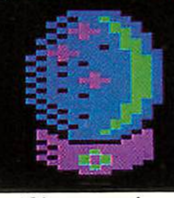




The Eerie Loading Screen



The Elf escapes from a Ravenbee



Close-up of a Crystal Ball



The Adventurer collects a Treasure Chest

## Ravenskull Castle — The Fortress of Doom

Your task is to save the village of Austburg from imminent devastation. You must enter Ravenskull Castle and retrieve the silver crucifix which the evil Baron Strieg has stolen. Only then will Austburg be safe from the Zombies who inhabit the swamp surrounding the medieval castle.

Ravenskull is a massive arcade-adventure featuring smooth 4-way screen scrolling over the 4 levels of play. Each level is 64 times the size of the screen, and there is an initially-bewildering variety of game characters including: acid pools, man-eating plants, time-doors, keys, pick-axes, scythes, spades, bows and arrows, dynamite, bells, food and wine (beware! it may be poisonous or have strange side-effects). There are also several magical scrolls and potions to be found. These may be good or evil; for example the strength scroll gives you the power to push wooden casks, whereas the lightning-strike scroll is fatal if used.

The guardians of the castle, the vicious Ravenbees have to be avoided or, in some cases, destroyed — but there is only one way to kill them; you must discover how as you venture through the dank passages of the castle. Your quest is not an easy one — only with time, experience and a little luck will you unravel all the mysteries within Ravenskull Castle.

### PRIZE COMPETITION

If you are skilful enough to complete Ravenskull, you can enter our prize competition. The prizes include a £100 first-prize, with Superior Software T-shirts for runners-up.

### PRICES

Electron cassette.................**£9.95**
BBC Micro cassette............**£9.95**
BBC Micro disc (5¼")...............**£11.95**

Ravenskull is compatible with the BBC B, B+, Master

SUPERIOR SOFTWARE Limited

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The screen pictures above show the BBC Micro version of Ravenskull.

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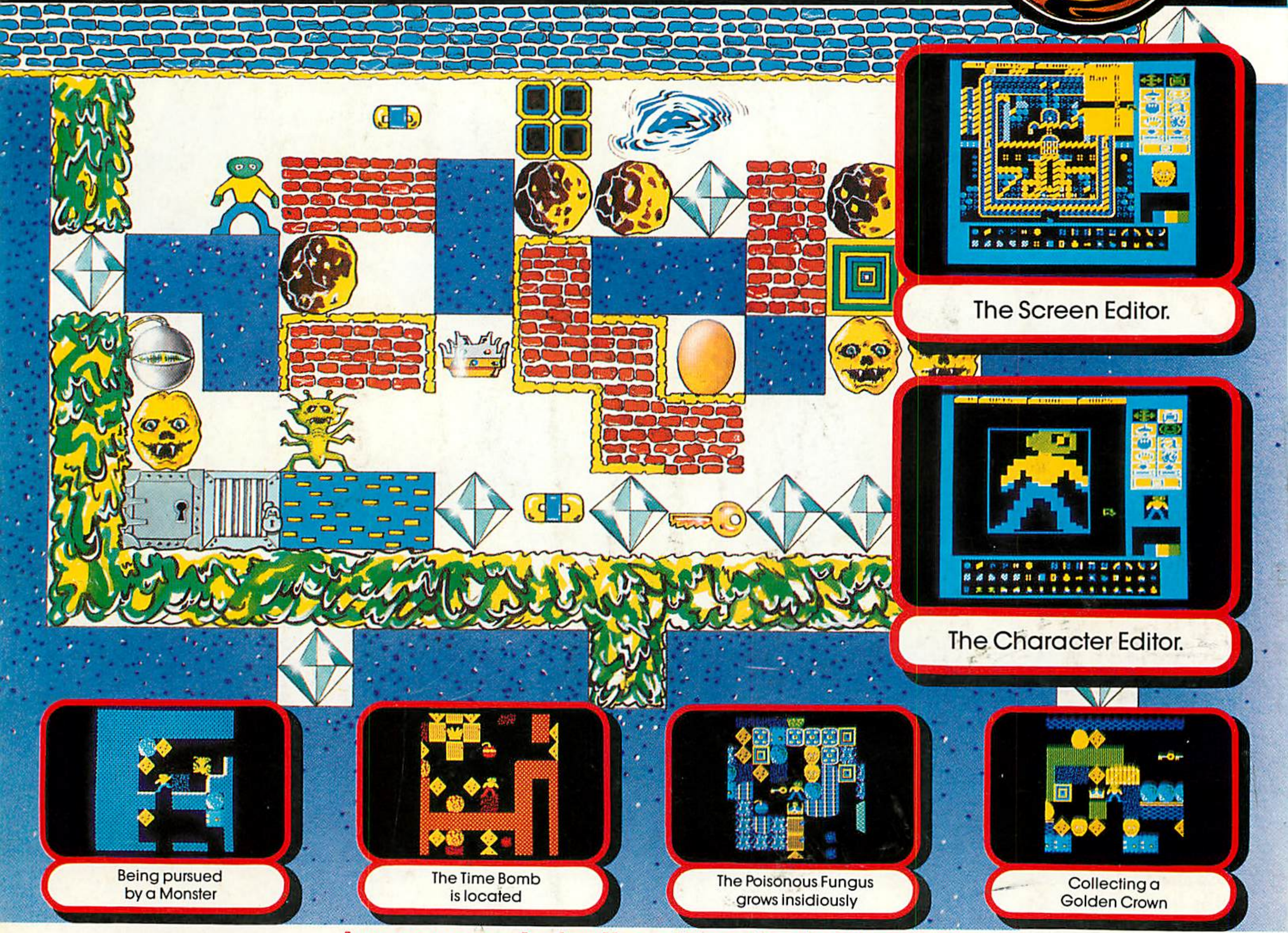
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- All mail orders are despatched within 24 hours by first-class post.
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- Faulty cassettes and discs will be replaced immediately.

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For the COMMODORE, AMSTRAD, BBC MICRO, ELECTRON

# REPTON 3

## THE ULTIMATE CHALLENGE



The Screen Editor.

The Character Editor.

Being pursued by a Monster

The Time Bomb is located

The Poisonous Fungus grows insidiously

Collecting a Golden Crown

## Are you ready for the ultimate challenge?

Our original Repton game was immediately acclaimed as a refreshingly new concept: a game requiring dexterity to complete its arcade-style elements, and clear logical thinking to solve its strategic puzzles. Repton involves retrieving treasure from cleverly-constructed traps of falling rocks whilst avoiding the fearsome monsters and haunting spirits. "This is an astounding game reaching new heights in BBC arcade adventures," enthused the Micro User magazine.

Last Christmas saw the release of Repton 2, larger and much more challenging than before. Acorn User's Technical Editor Bruce Smith wrote: "Repton 2 is better than anything I've played on the BBC Micro or Electron. Brilliant!"

Now, completely rewritten and improved for the Commodore, Amstrad, BBC Micro and Electron, we proudly present Repton 3. For the first time, a screen-designer is included: try to devise screens that will perplex your friends, then see if you can solve their newly-designed screens. Another innovation is the character-designer which enables you to design your own monsters, rocks, eggs, spirits, diamonds . . . any or all of the game's characters can be redefined as you wish.

Repton 3 is much larger than its predecessors — it has 24 fascinating screens, and players who are skilful enough to complete them all can enter our prize competition described below. All the favourite Repton characters have been retained, together with several new features: a creeping poisonous fungus which grows at an alarming rate; time bombs and time capsules (for puzzles in the 4th dimension); and golden crowns as well-deserved rewards for your endeavours. **Can YOU complete Repton 3?**

### PRIZE COMPETITION

If you complete Repton 3, you can enter our competition. Prizes include over £200 in cash, with T-shirts, mugs, badges and pens for runners-up.

**COMMODORE 64/128 • AMSTRAD CPC 464/664/6128**
**BBC MICROS: B, B+, MASTER, MASTER COMPACT • ELECTRON**

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The screen pictures above show the BBC Micro version of Repton 3.

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